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Middle East Logistics Institute for Training

Introduction to Logistics

Contents

1. Understanding Logistics

1.1 Learning Outcomes

When you have completed this section you will be able to:

- Explain the nature of logistics and supply chains for your organisation
- Explain the role of logistics in meeting your organisation's objectives
- Describe your organisational and logistics objectives
- State the factors influencing logistics decision making
- Describe the logistics solution available to organisations

1.2 The Nature of Logistics and Supply Chains

1.2.1 Introduction

We generally accept that the word 'logistics' was first associated with the military – being described as, 'That branch of the art of war pertaining to the movement and supply of armies' (Quoted in "Contemporary Logistics" (1996) by James C Johnson and Donald F Wood, Prentice Hall). Operations in all modern wars exemplify logistics. We may also see United Nations relief operations as having a significant logistical input.

Today, logistics is seen as a major element of commerce. The term includes the movement of goods and people. However, before we can supply any goods we must first obtain them. We may buy them off the shelf, but if they are not readily available we must have them designed and produced. All of these processes are part of logistics.

On the other hand before we can move people, we must ensure that the appropriate vehicles and related infrastructure available are suitable for the service we are going to provide. The ultimate aim is to provide a product or service to the satisfaction of a customer or consumer. We should also see logistics as an inclusive concept, embracing much more than the familiar, but now outdated, idea of just 'warehouses and lorries'. We sometimes describe logistics as achieving the 'six rights'

- Getting the right things (or people)

- In the right quantity
- To the right place
- At the right time
- In the right condition
- At the right price

Task 1.1

One of the six rights is ‘in the right condition’. Write a list of those factors you think are the most important to ensure that the desired objective is achieved.

1.2.2 Related Activities

We may consider that logistics comprises a series of interrelated activities and we could expect that a modern definition of logistics would reflect the broad scope of functions involved. The Chartered Institute of Logistics and Transport’s (CILT) definition follows this closely:

“Logistics is the science and art of the design, optimisation and management of networks for the time-related positioning of resource. In its most comprehensive sense, it includes those functions that deal with:

- The design and development, acquisition, manufacture, storage, movement, distribution, maintenance and disposition of goods
- The design, development, management and maintenance of passenger systems
- The acquisition or construction, maintenance, operation and disposition of facilities
- The acquisition or provision of services
- The collection, processing, analysis, distribution and interpretation of information in connection with all the above. These many and varied functions require a lot of management activity".

Task 1.2

Most businesses or organisations are perhaps likely to see only one of the five logistics functions as their main area of interest. A bus or transportation company, for example, is clearly involved in the design, development, management and maintenance of passenger systems. But that does not mean that the other areas are not relevant to it.

Suggest three other logistical functions with which a bus company would expect to be involved.

1.2.3 Supply Chains

There are a number of definitions of a supply chain. One definition is:

“The process that integrates, coordinates and controls the movement of goods, materials and information from a supplier through a series of intermediate customers to the final consumer” (“The Relationship Driven Supply Chain” (2007) by Stuart Emmett and Barry Crocker (2007) Gower))

The start of the chain can usually be identified as “Earth”, the normal origin of the base material – mineral ores (iron copper etc), coal, petroleum, and wood etc. In the automobile industry, a piece of steel may go through numerous processes in many different factories before being finally assembled in a car.

Every product or service has a supply chain. Likewise every organisation or activity is part of a supply chain. Supply chains are, in essence, a series of linked suppliers and customers. Some customers are in turn suppliers to the next organisation down, until a finished product reaches the ultimate end-user.

This description can be referred to as ‘*The external supply chain’.* We should also be aware of the *internal* supply chain – it can be said that the internal supply chain is that part of a given supply chain that occurs *within* an individual organisation.

So for a transport company, vehicle maintenance, operations, customer services are part of a chain to supply a transport service to the customers.

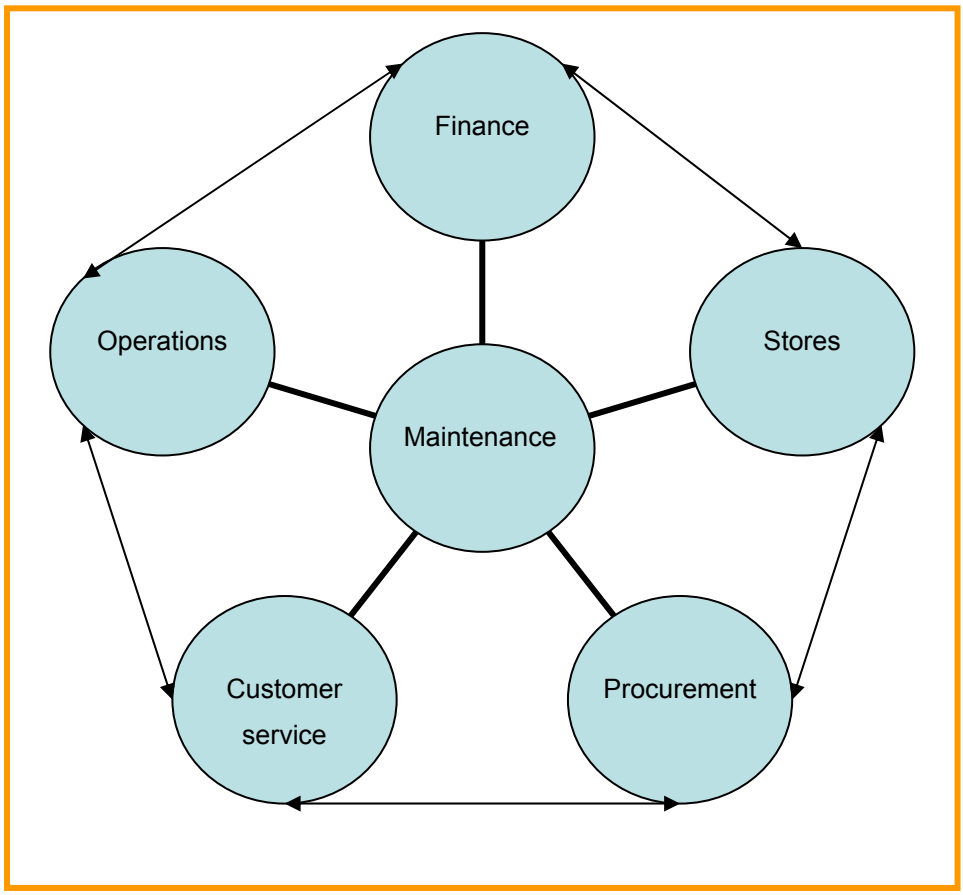


Figure 1.1: Internal supply chain

The above chart illustrates the functional activities that would comprise an internal supply chain for an organisation. Each one of the functions is a supplier and customer for the other such that an output from one becomes an input of another. They key issue is to ensure that all functions work together in a manner that improves overall performance of the organisation's goal.

The same would apply to our supply chain partners. It is clear that we need supplies from our external suppliers to be able to maintain, operate and provide the service to our customers. This becomes our external supply chain.

Both types of chain can be very complex. They can be of a global nature and in large manufacturers can span many divisions. A blockage in one span of the chain can ultimately lead to a breakdown in the supply of the good or service being offered

We should be aware that there is a multitude of supply chains. Some may be identified as 'typical' but we should note that in any process an individual item may well have its own unique chain. In their book, "Purchasing and Supply Chain Management", Lysons and Farrington (2006) have this to say:

"Supply chains can be classified in numerous ways. An organisation such as a food retailer will have many types of supply chains reflecting differences in products, services, production and distribution methods, customer-supplier relationships and information flows. Supply chains may be roughly classified according to four customer-supplier characteristics. They can also be seen in relation to virtuality, scope, service, complexity, products, purpose and value".

These terms need not concern us at this level. Lysons and Farrington expand the various types of supply chains using customer-supplier characteristics. These may give rise to:

- *Concentrated* chains found in businesses such as the automotive industry that have:
  - Few customers but many suppliers for components and parts
  - Customers with demanding requirements
  - Electronic Data Interchange (EDI) systems or a requirement for Just In Time (JIT) deliveries
- *Batch manufacture* chains that have:
  - Many customers and many suppliers
  - Complicated relationship webs – an undertaking with which an enterprise is in contact may, at different times, be a customer, supplier, competitor or ally
- *Retail and distribution* chains that have:
  - Many customers but relatively few suppliers
  - Customised methods such as vendor-managed inventory (VMI) of facilitating dealings with suppliers

- *Service* chains that:
  - Implement the mission statements of organisations such as hospitals, libraries and banks concerned with the delivery of services, books, information and financial services or restaurants and cinemas delivering food and entertainment, for example. Essentially, service chains are no different from manufacturing chains as every service involves people, something physical (an asset or part of something performed), an action and a time element.

Read pages 1-6 in “Supply Chain Strategies” (2004 by Tony Hines, Elsevier Butterworth-Heinemann). “Supply Chain Management” (2002 by Amy Zuckerman, Capstone Publishing) is a small paperback that gives an excellent overview of supply chains. It also gives a wide range of other relevant references.

The first three categories of supply chains refer to *products* whereas the last refers to the concept of a *service*.

1.2.4 Product

This is the physical and tangible item that we are in business to supply to the marketplace. For example, it might be a screw, a new car, a television set or a tin of beans. Other products might include fuel, oil, new buildings or medical supplies.

1.2.5 Service

This is where we perform some act of value, which unlike the situation where products are sold, does not result in the customer’s ownership of anything. Examples would be the provision of catering, grass cutting, security or transport. Services are seen as ‘intangible’, i.e. we cannot get our hands on them!

It is useful to use the image of a chain because the activities are linked and follow one another in a logical sequence. Each activity (or link) depends on the one before. Any activity that fails will, therefore, break the

chain and so our objective of delivering a product or service to the customer will fail. A successful chain has no weak links and each link has the same importance as any other. We will now consider a number of typical supply chains.

1.2.6 The Supply Chain for Food and Drink

These chains can be quite complicated – their complexity depending on the nature and origins of the products concerned. Four alternative models of the meat supply chain can be shown thus ("Food Supply Chain Management" (2001) by Jane F Eastham, Liz Sharples and Stephen D Ball, Butterworth Heinemann):

- Farmers ⇒ Auctioneers ⇒ Abattoirs ⇒ Processors and Manufacturers ⇒ Retailers ⇒ The Consumer
- Farmers ⇒ Auctioneers ⇒ Abattoirs ⇒Retailers ⇒ The Consumer
- Farmers ⇒ Auctioneers ⇒ Abattoirs ⇒ Processors and Manufacturers ⇒ Caterers ⇒ The Consumer
- Farmers ⇒ Auctioneers ⇒ Abattoirs ⇒ Processors and Manufacturers ⇒ Independent Butcher ⇒ The Consumer

1.2.7 The Supply chain for Manufactured Goods

In this chain we may be making a product like a bar of chocolate, a computer, a car or almost any other sort of manufactured product. This can be shown diagrammatically as below. In this kind of diagram the boxes are often referred to as the 'nodes' of the chain.

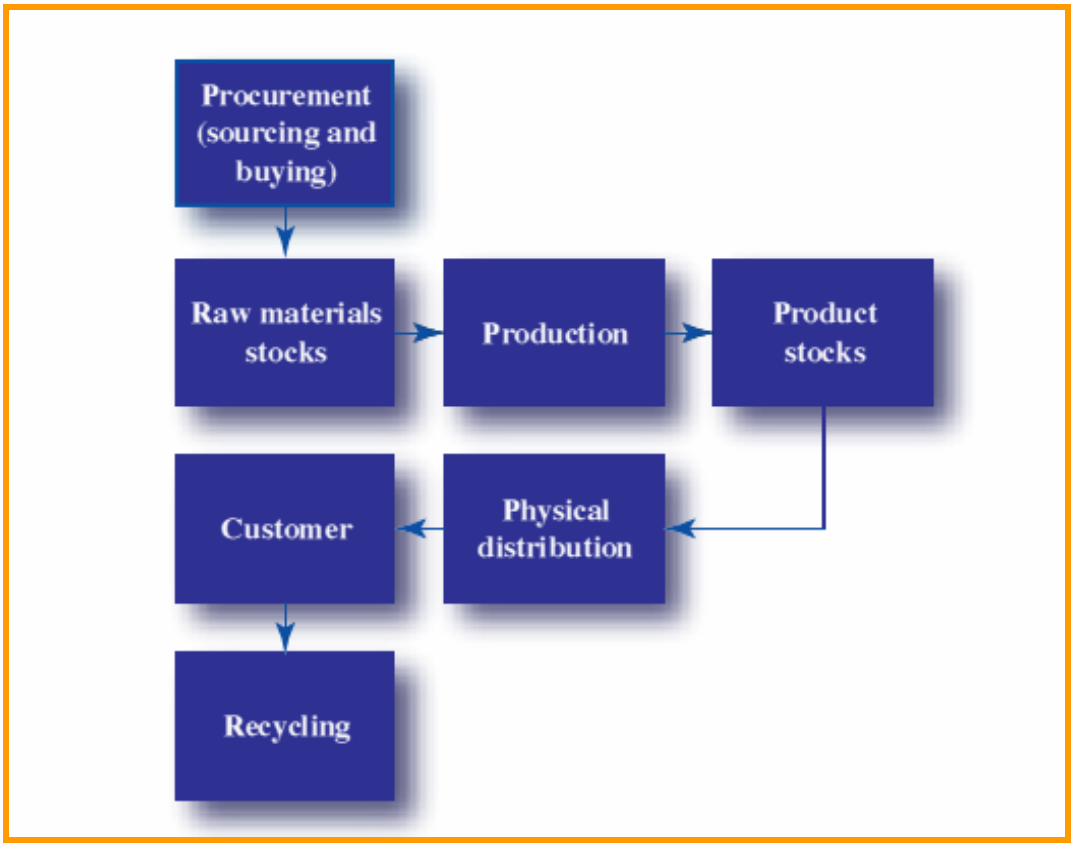


Figure 1.2: Supply Chain for Manufactured Goods

1.2.8 The Supply Chain for Infrastructure Assets

Our product here might be an office block, a hospital, a road, a bridge or an airport. It might be constructed by a private company, the government or a local authority. The important thing is that before we can use this product there is a sequence of processes that we must go through, which are shown in the diagram in Figure 1.2 below. This means that there is just as much a supply chain when the product is a hospital as when it is a tin of beans.

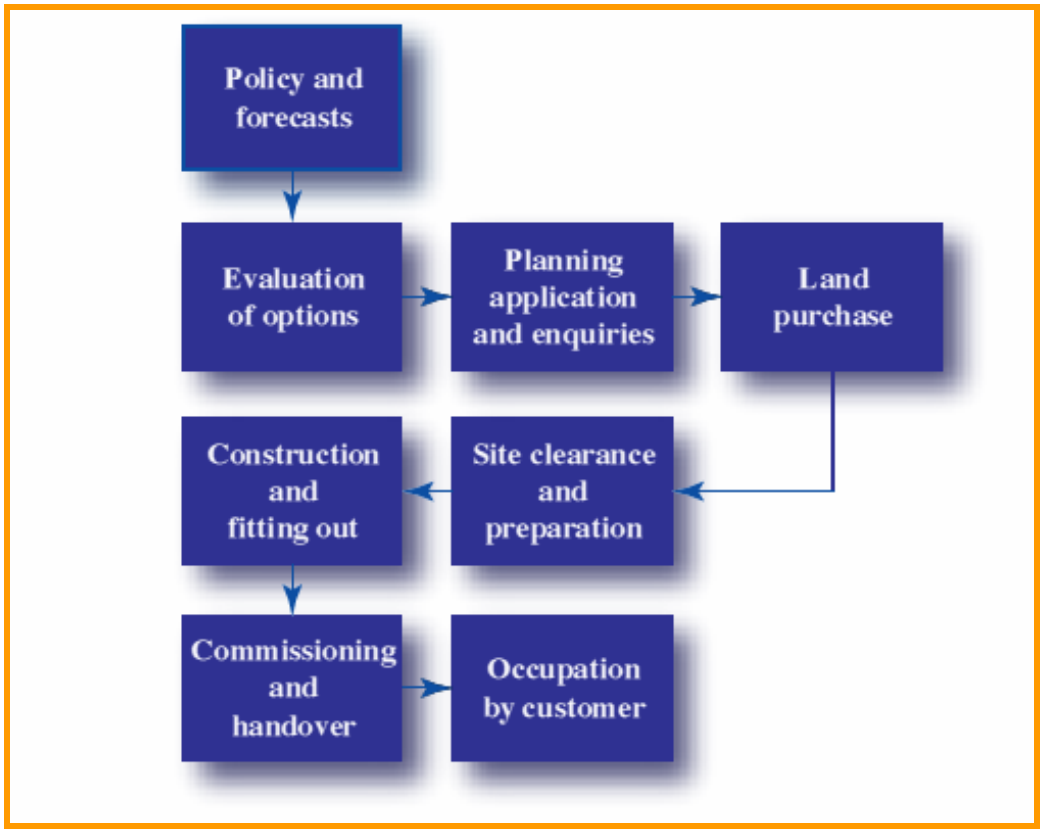


Figure 1.3: Supply Chain for Infrastructure Assets

1.2.9 The Supply Chain for Passenger Services

This example shows the process by which we bring a new passenger transport service into being. The final product of the transport industry is, strictly speaking, safe arrival in accordance with the published timetable. In this diagram we are concerned with an intermediate product – the availability of the service that can deliver the final product. The final node in the diagram really includes another supply chain within it, one that converts this intermediate product into the final product. Nevertheless, if the supply chain shown does not work properly, the final product of safe arrival in accordance with the published timetable is very unlikely to be achieved.

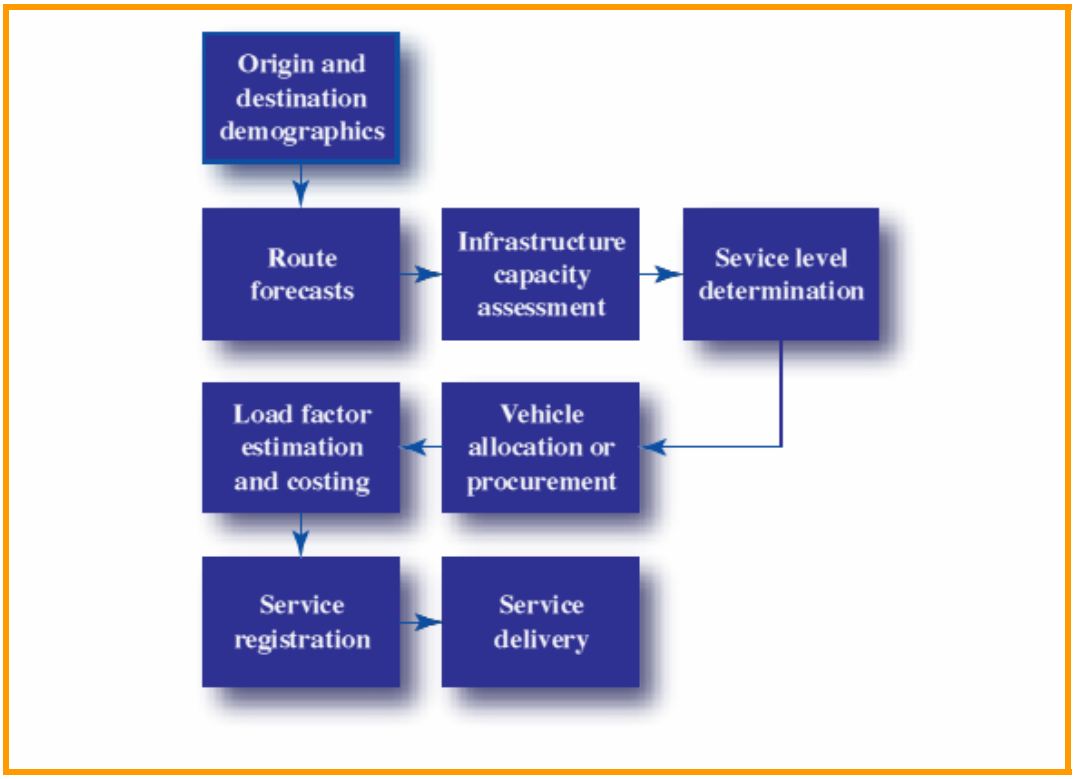


Figure 1.4: Supply Chain for Passenger Service

Task 1.3

Whilst in your local bank you notice the owner of your nearby 'open-all-hours' shop collecting bags of new coins for use in the shop till. Draw the supply chain for a new £1 coin in as great a detail as you can!

1.2.10 Third Party Logistics

Most organisations are primarily established for one main activity. This is often referred to as the organisation's 'core activity'. For example, a major supermarket may define its 'core' business as the provision of food stuffs and household items to its customers. Those goods require transport to get them into the supermarkets. Around twenty years ago the supermarket would also have run its own transport, but running vehicles can now be seen as not representing the 'core business'.

One solution is to let another organisation, whose own core business is transport, run that function on behalf of the supermarket. In the same way, warehousing could also be given to a company whose core business is that of warehousing. This very important concept is known as Third Party Logistics (3PL). In our examples above, the transportation and warehousing functions have been 'contracted out'.

The major factors to be considered whether or not to contract out are:

- Cost
- Performance
- Control
- Sustainability

The main benefits from 3PL can be identified as:

- Cost uncertainty reduced as the contract will specify predetermined costs
- Risk is lowered
- Maintenance costs are lowered
- The third party bring in specialised skills and knowledge
- Specialist carriers invest in the latest technology – at their total expense

Task 1.4

From your own observations on the road and at nearby supermarkets, write down as many examples as you can of Third Party Logistics (3PL).

1.2.11 Reverse Logistics

Generally speaking, supply chains operate from our supplier, through our organisation and on to our customers. However, we should be aware that sometimes they work in the opposite direction. This concept is increasing in significance as new regulations arise concerning the requirement for manufacturers to be responsible for the disposal/recycling of the product they earlier made! The essence of reverse logistics is to 'recapture value, or proper disposal'. Reverse logistics may also occur when:

- We return faulty goods for replacement or repair
- We return unsold goods for disposal
- We return promotional goods at the end of the promotional period
- We return packaging for reuse or recycling
- An aircraft engine has to be returned to the original manufacturer for major overhaul

1.3 The Role of Logistics

1.3.1 Organisations as Users of Logistics and Transport

It is difficult for many reasons to define the precise role of logistics. We can say, however, that whatever it may be it is one that continues to expand in both scope and importance. Such a role is often seen as a coordinating and facilitating activity. The desired outcomes of this role can be put simply as:

- Meeting corporate objectives
- Reducing overall cost – and at the same time…
- Improving service levels

We should note that logistics is a supportive role in business. Despite its great significance and importance, it invariably follows the aims of the business rather than leading them. However, it would be foolish to ignore the contribution that logistics will make in the eventual achievement of corporate objectives. It has been said that politics is 'the art of the

possible' – we may say the same of logistics! The specific roles that logistics will play depend largely on the size and nature of the business. In simple terms, the roles are likely to embrace:

- The Logistics Facility Infrastructure. That is, the correct locations, design and operations of facilities such as headquarter offices, warehouses, distribution centres, etc.
- Forecasting demand and obtaining and managing the correct resultant inventory
- Warehousing – the correct storage and maintenance of inventory and all the functions that take place therein
- Distribution of items to customers using the most appropriate and cost effective systems
- The use of modern technology to facilitate the vast amount of data and information that are now commonplace in all logistic operations

1.4 Organisational and Logistic Objectives

1.4.1 How Logistics Contributes to Achieving the Organisation's Objectives

All organisations exist for a reason. They have something to achieve. We can call this the 'aim'. The task of employees is then to help the business attain the aim by achieving certain set objectives. In many businesses these aims and objectives are well published in company literature and advertising material. In smaller firms this may not be so formal, but everyone will be aware of what they are trying to achieve. We may say that:

> 'Objectives are explicit statements of the results the organisation wishes to achieve'.

To understand more fully the place of objectives in business, we need to consider some other important aspects and concepts of business.

1.4.2 Strategy

This is often seen as a complicated subject. At our current level and for our immediate needs, let us consider strategy to mean (amongst other things) 'intentions'. Strategy is seen to have three levels. In brief, these levels reflect the 'time horizons' that go into their planning:

- Strategic (Corporate) – medium- to long-term
- Tactical (Business level) – short- to medium-term
- Operational (Day to day) – immediate to short-term

Each level is concerned with certain questions that range from the nature and very existence of the business at the top, to points of detail that result in things actually happening at the bottom! Our concern here is with the operational level. We need to look for a way in which this strategy can be passed down through all the levels in the organisation. Like a waterfall, we want the information to cascade down through the various levels of the organisation – from top to bottom. However, not every element that makes up this strategy is needed at the lower levels. One way of cascading strategy is shown below:

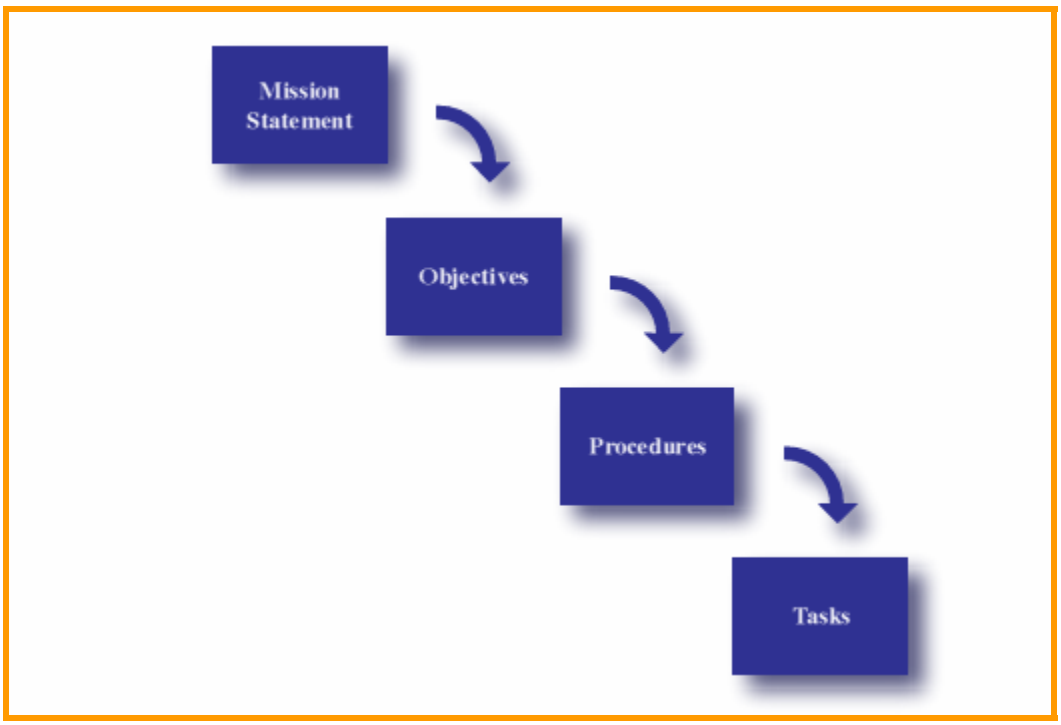


Figure 1.5: Cascading Strategy

Task 1.5

Write down the three levels of strategy.

1.4.3 Corporate Mission Statement

This is the highest level statement about what the organisation's leaders wish to achieve. It is an enduring statement of purpose for the organisation that identifies the scope of its operations in market terms and reflects its values and priorities. It will help the organisation to make consistent decisions, to motivate, to build organisational unity, to integrate short-term objectives with longer term goals, and to enhance communications.

The mission statement will usually be drafted by the Board and will be in the most general of terms. It is unlikely to indicate how the aims are to be achieved; that will be left to the senior executives to decide at their respective levels. Here are some examples of corporate mission statements:

- **Microsoft:** 'To enable people and businesses throughout the world to realise their full potential'
- **Nike:** 'To bring inspiration and innovation to every athlete in the world'

Corporate mission statements are unique to that organisation and set the scene for the message to cascade down to all levels. We can see from the examples that mission statements are written in a somewhat general form. They are the framework upon which all else in the company is based.

1.4.4 Setting Objectives

The next phase in the cascade is to set objectives. It is at this stage that the original mission statement is expanded to give details of the tasks that must be carried out in order to achieve the organisation's goals. We need to measure our objectives so that managers can assess progress (or

otherwise) towards the goals. A properly written objective will have a number of attributes, as we can see from the widely used acronym **SMART**.

- ***S*pecific.** We should state the objective as precisely as possible
- **M**easurable. We need to identify ways to measure achievement against the plan
- **A**chievable. We need to ensure that the objective can be carried out, given the resources at our disposal
- **R**elevant. We must ensure that the objective fits in with the organisation's stated mission statement
- **T**imed. We must include specific dates at which we will measure our progress

The acronym is sometimes extended with the use of **E**valuate, and **R**eview and thus becomes **SMARTER.**

An example of an objective for a single department might be:

'To achieve a 6 per cent saving in the use of packaging materials by the end of the next financial year'.

1.4.5 Procedures and Job Descriptions

Objectives then have to be translated into eventual action. We normally do this by using procedures and job descriptions. Procedures are instructions and rules on how we should carry out a particular function or set of functions. Once we have written our procedures, we can develop job descriptions based upon them. These provide details of how an individual or team should carry out their tasks.

For example, the objective above to reduce packaging cost by 6% could be the warehouse's contribution to a higher level objective to cut overall costs. We would expect to see how this was to be done reflected in the warehouse procedures and also in the relevant operator's job description.

We have thus seen how something that might have started as a vision at Board level cascades through lower levels, being modified in detail (but not in requirement or intent) until ending as a set of instructions that will result in a product or service.

1.4.6 Logistics Objectives

The development of these objectives follows a similar path to the construction of the overarching business objectives. It is important to remember that logistics objectives follow and support corporate objectives, which are the first priority. Nevertheless, as logistics has serious implications in all aspects of a business, it would be foolish to ignore such implications!

Read pages 51-56 in “Purchasing and Supply Chain Management” (Kenneth Lysons and Brian Farrington (2006), Prentice Hall).

Task 1.6

When setting objectives, it is usual to use the acronym ‘SMARTER’. In your own words, write short notes explaining the term that each letter represents.

1.5 Factors in Logistics Decision Making

Decision making is one of the most significant and important actions that we can take in business at any level. The ultimate aim of the decision making process in logistics is to arrive at the logistics solution, i.e. the one that achieves the desired end state in the most efficient, effective and economical way, or that which comes closest to it if, for whatever reason, it cannot be fully satisfied.

We can apply logistics thinking at any level in an organisation, right down to something as simple as the paperwork flows in an administration office. However, if our organisation is to gain the full benefits of logistic principles, they need to be applied across the organisation and the supply chain as a whole.

This is necessary in order for us to gain the necessary trade-offs that we require to maximise total efficiency and effectiveness. (A trade-off is where an increased cost in one area is more than offset by a cost reduction in another so that the whole system benefits. An example is given in **1.6.1**). It seems, therefore, that the responsibility for logistics policy rests at the top levels of the organisation, which is the only place where we will find all the facts. This can present difficulties.

The modern organisation in a free market needs to be an agile one, able to make rapid decisions in order to respond to changing circumstances and thereby gain an advantage over its competitors. In order to do this, we must make the decisions at the lowest possible level. However, if all the facts are known only at the top level of the organisation this might not be possible. As a result, we could find ourselves in a situation where a frontline operative needs to make a quick decision but the full facts are unknown at that lower level. To remedy this we need systems, structures and processes that create for people at all levels a framework of knowledge, information and policy. This will help them greatly when they make their decisions.

1.5.1 Specific Factors to Consider

We have seen that modern logistics is about both products and services and that the type of supply chain depends largely on the nature of the product or service. To help us manage logistics, it would be helpful if we were to highlight certain factors that we can use in the management of both products and services, as and when appropriate. For convenience, we call these factors the 4Ds:

- Demand
- Duration
- Distance
- Destination

1.5.2 Demand

There are three aspects to the demand for a product: the total demand, the frequency of the demand and the timing of the demand.

The Total Demand - This refers to the overall size of the demand and it will have a great effect on things such as our production methodology. A small demand will not usually merit large investment in fixed assets such as the purchase of special vehicles or setting up a special production line. Small demands can usually be provided for by hiring vehicles, batch production on existing machinery, or hiring space in someone else's facility. On the other hand, a large demand might mean that we will need to buy a new factory, set up a new production line and hire new people.

The Frequency of the Demand - This is in some ways linked to the total demand. Is the demand repeated often at short intervals (like washing powder or commuter travel) or only at long intervals (like washing machines or holidays)? Demand at short intervals tends to be larger than demand at longer intervals.

The Timing of the Demand - We sometimes refer to this as 'seasonality'. Even though the demand for many products is continuous, it is not always at the same level. The demand for commuter travel, for instance, is high

for about two or three hours at the start of the day and again in the late afternoon for five days a week; for the rest of the time, the demand is low. This has great implications for capacity and utilisation. Any operator attempting to satisfy this demand will need a large number of vehicles that are very poorly utilised for much of the time. Similar problems occur with seasonal goods such as festival crackers, seasonal eggs and suntan lotion. Many seasonal items are perishable, which precludes stockpiling (even if the cost is acceptable), and this means that we will need surge capacity to cope with seasonal demand.

1.5.3 Duration

This relates to the total period of time for which there is expected to be a demand, identified as three different categories: one-off, short-term and long-term.

One-off - This means that the demand for a particular product exists only once, even though there may be a demand for a large number of similar (but not identical) products. Taxis and spot hire operators in freight transport specialise in this sort of one-off movement. Although a taxi may carry many people in a day, the origins and destinations of each of them are different, making each trip unique. Because of the unpredictability of one-off operations, we will not usually draw up a predetermined schedule but we may devise one in response to each operation. In a similar way, we can include infrastructure products in this category: things such as buildings, roads and bridges.

Short-term – Here, the demand exists for a short period of a few days or weeks and then ends. Hauling away scalpings from road resurfacing is an example. As with the one-off operation, there may be other similar contracts at different sites but each contract is a unique product. We can include products such as commemorative china and World Cup souvenirs in this category.

Long-term - Here the demand exists for a long time or may even be continuous. Commuter travel and the production of consumer goods and

utilities like water and electricity are examples. For this sort of duration we will normally draw up a production programme or schedule. Even though the total demand is low, because we expect it to continue for several years, it may be worthwhile our making a special investment.

1.5.4 Distance

Distance relates to the movement requirements within a supply chain. Distance converts to time and we can consider it in three stages:

Stage 1 - From point of origin into the system. This might be the distance from home to the bus stop or from where raw materials are gathered to the processing site.

Stage 2 - Between stages in the system. Here we are concerned with what distances are involved once the people or raw materials are in the system. This covers the actual journey length once the passenger is on the vehicle or the distance travelled by products during the manufacturing process. This distance may vary from a few hundred yards for a short journey or a production line, to thousands of miles for a longhaul flight or a distributed production process where different sub-assemblies are built up in different plants and then brought together for final assembly.

Stage 3 - Between exit from the system and the final destination. Here, we deal with the distance from the last point under direct control of the system operator to the eventual destination of the products or people. This might be from the shop or airport to home. We are often left to our own devices over this distance.

Proper supply chain thinking encompasses and integrates all three of these stages, i.e. from the point of origin to the hands of the end-user. However, significant differences apply to the three stages and that is why we have dealt with them separately here. For example, the first stage for bus passengers will usually be on foot and under their own control but the bus route planners will have to take into account the likely origins of passengers and how far they might be prepared to walk to a bus stop. Similarly, home delivery sets out to integrate the final stage into the

system, removing what might be a barrier for customers, in the same way as the British Airways limousine service works for air travellers.

1.5.5 Destination

Destination does not necessarily mean the actual destination of a passenger, product or service, but the point to which we deliver our organisation's product. This may be the same thing, but it may not. For an airline, the final delivery of the product is when the customer leaves the aircraft at its destination. However, this is unlikely to be the final destination of the passenger. Similarly, a car manufacturer may deliver one of its vehicles to a car showroom but the person who buys it is likely to drive it home. Proper supply chain thinking would extend product delivery to include the final destination because all other considerations must relate to that moment.

In all cases, there are likely to be a number of intermediate destinations, as goods move through the supply chain from raw materials to finished products, or as passengers move through the stages of a journey. In logistic terms, these are not destinations but simply 'way-points'. When the total delivery of the product is shared between different organisations, way-points may represent destinations for specific organisations or service providers. Considerations about destination include the following:

The Market - What is the nature of the marketplace in which we are delivering the product? What sort of customers are we delivering the product to? Marketing mix and market segmentation are further aspects that we should consider in this context.

Accessibility of the Destination - How accessible is the destination, both to the customer and to the provider of the product? Bus services in some housing estates or rural areas sometimes involve a lengthy walk to or from the bus stop; the question arises whether we can make the destination of the bus coincide more nearly with the destination of the passenger.

Often, the answer will be that we can't because the passenger's destination is inaccessible to the bus owing to narrow roads, sharp corners or low bridges. We face similar problems when we try to deliver goods to town centre shops.

Facilities at the Destination - What facilities are there to help us to deliver the product? This will include seating and cover for waiting passengers, as well as equipment for handling goods. We might also include electronic point of sale equipment to handle credit and debit cards and produce an itemised bill. Logistics requires us to consider all these factors together so that we arrive at the optimum solution. The factors may combine in a way that is positive or negative.

For example, in the movement of goods or people, when demand is continuous and steady, duration is long-term, distance is short and the destination is readily accessible with good facilities, these factors combine positively and we can set up an economical and efficient operation using a minimum fixed number of vehicles operating on a continuous loop. If demand is seasonal there is a negative effect, and we will need a different number of vehicles at different times. This will lead to problems of the efficient utilisation of assets, availability of surge capacity and varying manpower requirements.

The location of industry in an area that gives grants and tax privileges may be financially advantageous. However, places like this are often remote from the marketplace and there can be a serious implication for distance. The same is true for people who live in the countryside, where the distance to work, shops, schools and entertainment can be much greater than in the town.

Task 1.7

Write down the terms represented by the '4Ds' and explain them in your own words.

1.6 The Logistics Solution

1.6.1 Trade-offs

We have defined a trade-off as being where an increased cost in one area is more than offset by a cost reduction in another so that the whole system benefits. We may think that logistics is a complex business and at times there is no easy solution. We have to consider many factors. In so doing, we may discover that by choosing the best solution for one factor results in a poor solution in another related factor. In simple terms, we cannot have it all ways! For example, we may decide to reduce the number of warehouses in our organisation – to save money on running them – but this may well result in the company having to spend more money on the transportation of products over greater distance to our customers.

We may consider an example in transportation. By choosing a low-cost airline we may buy a cheaper ticket than that from a major airline. However, our low-cost ticket may only take us to an airport that is some considerable distance from our desired ultimate destination – the major airline would take us very close to that destination but at a higher cost. We therefore have to balance one

solution against the other and sort out our priority between, say, cost and convenience.

Trade-offs also feature in large capital expenditure such as the purchasing of Fork Lift Trucks (FLTs). We may be able to purchase one for, say, £20K but by spending £25K we may make savings of, for example, £10K over the whole life of the FLT. In each example we have referred to 'cost'. In the case of the FLT, we would have needed a number of figures in addition to the price of the equipment. We would be interested in the fuel consumption (diesel per hour, Liquid Petroleum Gas per hour, etc.). We would want to know the maintenance costs. All of these need to be known in order to make the purchasing decision. By considering all of these entities we are pursuing what is known as the 'total cost approach.'

Task 1.8

Write short notes on the concept of 'Trade-offs' and give examples.

2. People in the Logistics Working Environment

2.1 Learning Outcomes

When you have completed this section you will be able to:

- Explain the working environment for logistics organisations
- Describe the various Logistics roles and responsibilities
- Explain the role of Training and development in logistics operations
- Explain the health and safety regulations applicable to your organisation
- Assist in risk assessment tasks in your work

2.2 The Working Environment

2.2.1 Different Types of Organisation

An excellent introduction to this subject is found in "The Business Environment" (Worthington and Britton, 2006), which states:

"Most business activity takes place within an organisational context and even a cursory investigation of the business world reveals the wide variety of organisations involved, ranging from the small local supplier of a single good or service to the multibillion dollar international or multinational corporation producing and trading on a global scale. Given this rich organisational diversity, most observers of the business scene tend to differentiate between organisations in terms of their size, type of product and/or market, methods of finance, scale of operations, legal status and so on. Nissan, for example, would be characterised as a major multinational car producer and distributor trading on world markets, while a local builder is likely to be seen as a small business operating at a local level with a limited market and relatively restricted turnover."

2.2.2 Business

A business can be defined as:

The organised effort of individuals to produce and provide goods and services to meet the needs of society. It can be viewed as a broad concept, incorporating profit making concerns such as manufacturing firms and banks, and non-profit making concerns such as schools and hospitals.

2.2.3 Organisation

An organisation can be defined as:

The way in which people are grouped and the way in which they operate to carry out the activities of the business. We define the key elements of the organisation as the goals of the business and the way they are formulated, the ownership and control, size, structure and organisational culture.

2.2.4 The Three Sectors of Business

These are categorised as:

- The Private Sector
- The Public Sector
- The Third Sector (sometimes called 'Non-profit')

2.2.5 The Private Sector

Put simply, we can say that The Private Sector is that part of the economy that is run for private profit and is not owned or controlled by the state. Such organisations fall into a number of different categories. At this level we need not delve too deeply, but a familiarity with some of the terms will be helpful. Legal and financial matters are significant features. Some of the several categories are:

- **Sole traders** – organisations operated by one person
- **Cooperative** – an autonomous association of persons united voluntarily to meet their common, economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise
- **Partnerships** – organisations consisting of between two and twenty people who run the business on a collective basis and share the profits
- **Limited companies** - where one or more people incorporate a company by registering it with the Registrar of Companies (in the United Kingdom). The organisation has a legal personality distinct from its owners or shareholders and in the event of the company becoming insolvent and being forced into liquidation, the assets of the owners are generally protected. Limited companies may be private or pubic. Another significant difference is that public limited companies have 'plc' after their name, as in Tesco plc, while private limited companies have 'Ltd' after their name.

2.2.6 The Public Sector

Public sector organisations come in a number of forms, which include:

- Central government departments
- Local authorities
- Regional bodies
- Non-departmental public bodies or 'quangos'
- Central government trading organisations
- Public corporations and nationalised industries

2.2.7 The Third Sector

In the Government's words, "The third sector is a diverse, active and passionate sector. Organisations in the sector share common characteristics:

- Non-governmental
- Value-driven
- Principally reinvest their surpluses to further social, environmental or cultural objectives

The term encompasses voluntary and community organisations, charities, social enterprises, co-operatives and mutuals both large and small."

Task 2.1

What are the Three Sectors of Business? Write short notes on each.

2.2.8 The Size of Organisations

One of the many factors that differentiate the way businesses operate is that of size. We can measure this size in a number of ways, but it can become complicated. Some of the measures used are:

- Turnover
- The value of the output
- The capital employed
- Level of employment

At this level, we will concern ourselves with that of employment levels. We could class businesses by the number of people they employ. In simple terms, we could call them small, medium and large – depending on numbers! The problem is to define the numbers we would allocate to each group, which we can see by looking at the table below. This is taken from a government statistic and has been adapted for simplicity.

Employment size group	Number of units	% of total	Employment (000s)	% of total
1-9	1018120	83.0	3828	15.4
10-19	112780	9.2	1575	6.4
20-49	59015	4.8	1822	7.4
50-99	17740	1.5	1241	5.0
100-199	9155	0.8	1274	5.1
200-499	5625	0.5	1731	7.0
500 and over	4485	0.4	13300	53.8

(From Worthington and Britton 2006)

Table 2.1: Size Structure of UK Industry by Employment

We should be aware that the European Union (EU) has defined matters more precisely but have, in some cases, added financial statistics. Considering employment figures only, we can refine the above table in light of the EU classification:

Number of employees	Type of firm
0-9	Micro businesses
10-99	Small enterprises
100-499	Medium-sized enterprises
500+	Large enterprises

(From Worthington and Britton 2006)

Table 2.2: EU Classification

2.2.9 Small and Medium-Sized Enterprises (SMEs)

Over the last twenty years, these have become increasingly important. This should be seen against the changing patterns of large industries over the last half of the twentieth century, especially so in the case of the UK, where there has been a marked decline in manufacturing and a sharp rise in the service sectors. Many of the products once made in the UK are now made in Asia and the Far East. SMEs display a number of characteristics, some of which are:

- They are independently owned
- Their capital is raised from a limited number of individuals
- They tend to operate in local areas
- They tend to have small, clearly defined markets
- They may tend to make small numbers of specialised products of a non-standard nature and where quality is of particular importance
- They are often creative and trailblazers of innovative ideas
- They can have a wide range of employees – from as few as 1-5 to as many as 400-500
- They can have a wide range of turnover – from, say, £50K to £100M

2.2.10 Advantages of the Smaller Business

By this we mean those with less than 100 employees. Some of these advantages are shown below:

- They are relatively easy to set up – and close down!
- The owner has a marked degree of independence
- Profits do not have to be disbursed (e.g. to shareholders in the form of dividends etc.)
- They have flexibility and can respond quickly to changing requirements
- They are tightly staffed – no spare or wasted labour!
- Staff tend to be dedicated and work hard
- Specialists can be hired as and when required

2.2.11 Disadvantages of Smaller Businesses

Some of these are:

- Financing can be difficult, especially at 'start-up' – and expansion times due often to the 'risk factor' felt by the lender
- Staff recruiting can be a problem
- Training can be non-existent due to lack of time (and funding)
- The 'family effect' – quite a few businesses are started by one or two family members who initially demonstrate many of the advantages shown above. However, as the business grows they can tend to lose this flair and become 'risk-averse', cautious and reluctant to expand or take on board non-family management!

2.2.12 Large Businesses

In great contrast to SMEs we have the large businesses (500 plus employees) and the multinationals, whose size can run into tens of thousands of people, Well known multinationals include BP and GlaxoSmithKline from the UK, Volkswagen and Nestle from Europe, and General Electric, IBM and Microsoft from the USA. These are well known businesses at the time of writing and have been chosen because of their relative longevity to date.

2.2.13 Typical Characteristics of Large and Multinational businesses

For convenience, both types have been brought together as one – not all of the following will of course apply to them all!

- Their mere size gives them huge influence in many spheres (purchasing power, political influence, etc.)
- They contribute to what we know as ‘globalisation’
- Their output is immense
- They often retain some of the characteristics identified much earlier in businesses of the last century such as:
  - They are bureaucratic and authoritarian
  - They tend to be very performance and market share orientated (i.e. product rather than people oriented. They will, of course, claim the opposite!)

- Despite much acclaimed ‘downsizing’, they remain very structured and process orientated
- They sometimes carry out the old ‘hire and fire’ practices under more modern terminology!

- They have, for whatever reason, contributed in the past to some destruction of the environment – although many of them are now operating in a much more ‘environmentally friendly’ way
- Since many are involved in energy, chemical and food production they can have negative as well as positive effects on countries (especially in what we know as the ‘developing world’, which is often the source of these raw materials)
- They invariably have to disburse some of their profits to shareholders

2.2.14 Advantages and Disadvantages of Large Businesses

It would be reasonable to say that because of their *scale*, these businesses have such strengths that they can eliminate any weaknesses! Much of that would be true; however, when such a business fails the consequences are, by definition, huge. Furthermore, their very size limits their flexibility and to some extent the speed of response to pressing and changing requirements There is also a body of opinion that sees ‘the multinationals’ as being too strong and influential and also as contributing to pollution and in some cases poverty. We now look at Co-operatives, which we met earlier under the Private Sector.

Task 2.2

Study the table from Worthington and Britton on the size structure of UK industry by employment. Note the two largest ‘% of total’ figures. What do you think this tells us about the structure of UK business? Do you think this is a good or bad thing? Give your reasons.

2.2.15 Co-operatives

The International Co-operative Organisation has defined them as:

> 'An autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically controlled enterprise'.

In their website, they paint this picture of what they are:

- Ranging from small-scale to multi-million dollar businesses across the globe, co-operatives are employers to more than 100 million employees and have more than 800 million individual members.

2.2.16 The Co-operative Difference?

Co-operatives are enterprises that put people at the centre of their business, and not capital. Co-operatives are business enterprises and thus can be defined in terms of three basic interests: ownership, control, and beneficiary. Only in the co-operative enterprise are all three interests vested directly in the hands of the user. Co-operatives put people at the heart of all their business. They follow a broader set of values than those associated purely with making a profit. Because co-operatives are owned and democratically controlled by their members (individuals or groups and even capital enterprises), the decisions taken by co-operatives balance the need for profitability with the needs of their members and the wider interests of the community. Co-operatives are also enterprises that follow a set of principles and values – The Co-operative Principles.

2.2.17 Co-operatives are Significant Economic and Social Actors

All over the world, millions of people have chosen the co-operative model of business enterprise to enable them to reach their personal and community development goals. Co-operatives create and maintain employment, providing income; they are not only responsible for producing and supplying safe and quality food and services to their members, but

also to the communities in which they operate. By putting the Co-operative Principles and ethics in practice they promote solidarity and tolerance, while as 'schools of democracy' they promote the rights of each individual – . Co-operatives are socially conscious, responding to the needs of their members whether it is to provide literacy or technical training, or to take action against the “a” pandemic. Through their varied activities, co-operatives are in many countries significant social and economic actors in national economies, thus making not only personal development a reality, but contributing to the wellbeing of entire populations at the national level.

Task 2.3

Co-operatives are sometimes associated with the concept of “Fair Trade”. What goods are available under the Fair Trade label in your local supermarkets?

2.3 Logistics Roles and Responsibilities

2.3.1 Types of Jobs and their Key Functions

We can note from Section 1, Understanding Logistics, that the nature of logistics is wide ranging and diverse. In terms of a product, it is sometimes referred to as a ‘from cradle to grave’ activity! In this part we look at types of jobs and their key functions. This we will do by considering the following:

- The organisation chart of a fictitious logistics organisation – for illustrative purposes
- A selective list of functions derived from the chart
- A selection of elements that make up a chosen function

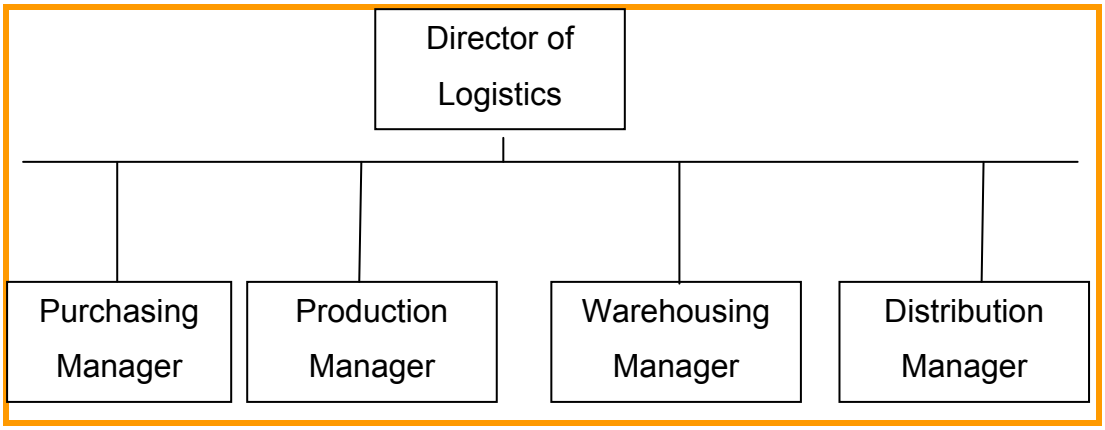


Figure 2.1: Basic Organisation Chart for a Medium Sized Company

(For illustrative purposes)

From this chart, we have chosen two sections:

- Warehousing, which can consist of:
  - Receiving
  - Storage areas
  - Picking
  - Packaging
  - Materials Handling Equipment (MHE)
  - Inventory control
- Distribution, which can consist of:
  - Routing
  - Marshalling and loading
  - Control of third party transport

2.3.2 A Selection of Elements that Constitute the Inventory Control Function:

Inventory control is defined as:

> The policies and procedures that systematically determine and regulate which items are kept in stock and when to replenish after issuing the stocks.

Personnel employed in inventory control are likely to be involved in some or all of the following:

- The decision to stock
- Determining how much to stock and when to order
- Assessing demand patterns
- Setting inventory parameters, i.e., maximum and minimum levels
- Replenishment systems, i.e., when to reorder and how much per order.
- Standardisation and variety control
- Forecasting and material planning
- Physical stock checks
- Reports

2.3.3 Elements that Constitute the Warehousing Function

The terms 'warehouse' and 'stores', or indeed 'warehousing' and 'storekeeping', are often seen as interchangeable words. We will do the same – after all, they are both buildings that hold stores! A longstanding definition of storekeeping is:

'Those procedures and means whereby goods are received, identified, stored, issued, accounted for and replenished in accordance with defined levels of service and with due regard for the statutory requirements for health and safety.'

Figure 2.2: Warehouse functions

Personnel involved in storekeeping activities are likely to be involved in some or all of the following:

- Receiving stock – identification, inspection, handling, and documentation procedures
- Identifying – involvement in the use of coding systems
- Storing – location of stocks, storage procedures and 'housekeeping' (tidiness etc.), allowing for the nature of items
- Issuing – authority, procedures, picking and packaging
- Marshalling of materials for dispatch
- Update of records
- Accounting – stocktaking and stock checking

Task 2.4

List the activities that might be undertaken by storekeepers. Why do consider these activities to be essential for the overall logistics objectives?

2.4 Training and Development

The importance and relevance of training and personal development cannot be over emphasised. The UK government-sponsored Leitch Report highlighted the skills shortage in the UK.

. According to the Sector Skills Development Agency the UK is currently still about the fourth or fifth largest economy in the world, but in terms of human capital it languishes in 17th place. Too many people stop learning far too young. Participation levels in post-i6 education and training are far below the Organisation for Economic Co-operation and Development

(OECD) average. The onus is not just on employers, though. Individuals will be expected to take responsibility for updating their skills'.

The Collins English dictionary defines training as:

- The process of bringing a person to an agreed standard of proficiency by practice and instruction

The Business Dictionary defines training as:

- Organised activity aimed at imparting information and/or instructions to improve the recipient's performance to help him or her attain a required level of knowledge or skill

There are several definitions you may find on training but you will discover that training is about:

- Imparting knowledge and skills in order for recipients to improve in their performance in the work environment.

A major corporate objective of training is to develop an efficient workforce at all levels, to ensure that corporate objectives can be met. Organisations may decide to train for a variety of reasons. Some of these reasons are:

- There is an introduction of new technologies or work systems
- There has been an unacceptable increase in poor quality output
- High accident rates
- Unacceptable performance appraisal reports
- To enable the employee to do their current job at a higher standard
- To prepare an operative for a higher level job – this is more to do with developing the employee for their full potential

To prepare an operative for a completely new job In all the above training will bring several benefits to an organisation including::

- Enhanced all-round knowledge of the job
- Improve performance output
- Reduction in accidents and customer complaints

- Attaining professional and technical qualifications
- Cross cultural/experience exchange
- Self-awareness and self-motivation

An impetus for personal self-development You may have already experienced some training before and you are already by going through this programme, undergoing some training programme. Here are some of the training types most organisations have for their staff:

- Induction training – for all new employees
- Apprenticeship training – for a particular trade or industry
- On-job training for operators on a particular job
- Supervisory or leadership programmes
- Professional qualification programmes

Figure 2.3: In-house training

2.4.1 Continuing Professional Development

The Chartered Institute of Logistics and Transport (CILT) in the United Kingdom defines Continuing Professional Development (CPD) as:

'The systematic maintenance and improvement of knowledge, skills and competence throughout a professional's working life. It is about maintaining and improving standards of competence and professionalism. The onus is on the learner to take responsibility for developing and directing their own career.'

A number of chartered institutes run some excellent CPD programmes, which are shown on their respective websites. CILT is no exception and offers similar opportunities. The key points are summarised in the following extract from the CILT (UK) website:

'As a member of a professional body such as CILT you are expected to make a commitment to ensure that the knowledge and skills you gained in order to qualify for membership are systematically maintained at a suitable level.'

This means that members are expected to commit themselves to continue updating their knowledge, skills or competencies.

Task 2.5

A major corporate objective of training is to develop an efficient workforce at all levels, ensuring that corporate objectives can be met. What are three good reasons for this?

2.4.2 Statutory Training

Whist the training and development we have considered so far may be described as very desirable – even essential – there is another sector of training that has a legal requirement. This means that employers and individual employees are required by laws of the country to demonstrate

that certain training has been done successfully. For an example, you may not drive or operate a certain type of vehicle or equipment unless you have been trained and hold a licence or certificate for it. Contravention of this requirement will be a criminal offence for both the employee and employer.

Some areas are covered in the health and safety section below but others, particularly those involving transport, include the European Union (EU) Directive 2003/59 for drivers of large goods and passenger carrying vehicles (LGVs and PCVs). Other countries have specific regulations regarding drivers of particular types of vehicles. You need to make yourself familiar with these requirements.

2.4.3 Training In Health and Safety

The Management of Health and Safety at Work Regulations 1999 (UK) (these Regulations and all others that follow are easily accessed by entering their titles in a good 'search engine') dictate that we must provide health and safety training for people:

- When they start work
- When their work or responsibilities change
- Periodically, if their skills are not used regularly

We must provide training during working hours and not at the expense of the employee. We will need to give new recruits some induction training, which must include an explanation of the company's safety policy and the action to be taken in health and safety matters. Young and inexperienced employees need special consideration, and in our multicultural society we should give particular attention to any language difficulties.

One method of training is watching an experienced member of staff doing the job. . This is where a learner learns from an experienced person on the job. This can be quite effective, but much depends on the experienced member of staff. How good are they at the job and at passing on the skills?

Where health and safety is concerned, we must be quite sure that our new employee is getting the right message. It has been said that training is expensive, but that ignorance is even more expensive.. Nowhere is this truer than in health and safety especially in our logistics operations.

2.4.4 Careers and Progression

Logistics continues to expand as a global profession.. Quality personnel are required throughout the world in logistics organisations. This can be seen by glancing at the jobs/appointments pages in any national newspaper. and in relevant professional journals such as CILT (UK)'s magazine, *FOCUS*.

We have seen some of the elements that are found in warehousing, inventory control, and distribution. Such jobs offer a wide range of activities along with many others throughout the supply chain. This creates a diverse career structure, offering challenges and progression to Board level for the qualified and competent candidate. Details of careers in logistics can be found on the CILT website. A number of professional training programmes are available at various levels within the industry structure (e.g. CILT for new entrants, line and supervisory staff, middle and strategic management levels.)

2.5 Health and Safety

2.5.1 Implications for Organisations and Individuals

This is perhaps the subject most familiar to us all. Over the past thirty-five years, it has posed advantages and disadvantages to companies and individuals alike. The advantages can be seen in areas such as:

- A safer workplace in all aspects – environmental, equipment, welfare facilities and many others
- A reduction in the number of work days lost through accidents and injuries
- A more motivated workforce who note, accept and are happier to work in a company who obviously care about the safety and welfare of their employees
- Better equipment designed in terms of safety, noise levels, vibration, ease of use, etc.
- A safer and healthier environment to the wider sphere of all stakeholders (shareholders, customers, suppliers, the neighbouring community, etc.)

The downsides include:

- Increased cost to employers by having to provide these safer environments, equipment and safety equipment.
- A possible constraint on operations due to the stringent requirements of laws and regulations that apply
- The need for operatives to wear protective equipment that is not always seen by the wearer as either comfortable or beneficial!
- A greater onus on the individual for their own safety and those of others in the same environment and area

The great move forward in matters of health and safety has been brought about in the UK and many other countries in two main ways:

- Legislation and regulation

- A legal system that is able to apply and enforce such laws and regulations, and attempts to punish guilty offenders. In UK, the basis of all such matters is the Health and Safety at Work Act 1974, which we will look at in more detail below.

2.5.2 The Health and Safety at Work Act 1974

The Act, (also known also as 'HASAW' or simply 'HSA') requires the employer to carry out actions that are reasonable and practicable in order to protect their workforce. The Act covers not only those who work full-time but also part-timers, casual workers and outside contractors. It also includes those who may use our business premises or equipment, which may include visitors and delivery drivers.

Under HASAW, it is clearly stated that it is the responsibility of employers to maintain the health, safety and welfare of all employees. This includes publishing a statement of their health and safety policy, providing safety equipment and training their staff.

The regualtion also states that employees must:

- Co-operate with their employer in all health and safety aspects
- Undertake any training provided
- Use the safety equipment provided by their employer as they were trained to do
- Report any unsafe practices and not misuse safety equipment

Furthermore, employees have a responsibility to ensure their own safety and that of anyone else who might be affected by their acts or omissions. Manufacturers of equipment have a specific responsibility under HASAW to ensure that their product is safe to use in the environment it was designed for in normal circumstances, and is fit for its purpose.

2.5.3 Other Regulations

Although HASAW lays down the general arrangements for health and safety, the specific safety requirements are laid down in the various sets of regulations that are enforced under the Act. The regulations show, therefore, the day to day requirements that we must follow.

The six sets of UK regulations came into force in 1992 (but some of them have since been updated and are also subject to more recent amendments). They are often referred to as the 'Six Pack', and are as follows:

- The Management of Health and Safety at Work Regulations 1999
- The Workplace (Health, Safety and Welfare) Regulations 1992
- The Provision and Use of Work Equipment Regulations 1998 (PUWER)
- The Manual Handling Operations Regulations 1992
- The Health and Safety (Display Screen Equipment) Regulations 1992 (DSE)
- The Personal Protective Equipment at Work Regulations 1992 (PPE)

Task 2.6

What are the four things that employees must do under the Health and Safety at Work Act? Apply some of these things in the context of your organisations' country of operation.

Just by looking at the title of the regulations you will observe that these regulations have a special relevance in logistics operations and we have expanded them further below. Although the regulations only apply to UK, a brief look at the health and safety aspects regulated as shown below, reveals that these aspects are common and applicable for all logistics and supply chain environments. It is possible that in some countries the same

aspects are covered or regulated under various applicable legislation. Our responsibility as logistics and supply chain operators,is to make sure that we are familiar with any applicable legislation.

2.5.4 The Management of Health and Safety at Work Regulations 1999 (The Management Regulations)

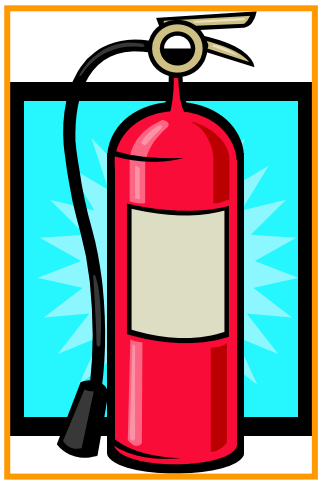
These generally make more explicit what employers are required to do to manage health and safety under the Health and Safety at Work Act. Like the Act, they apply to every work activity.

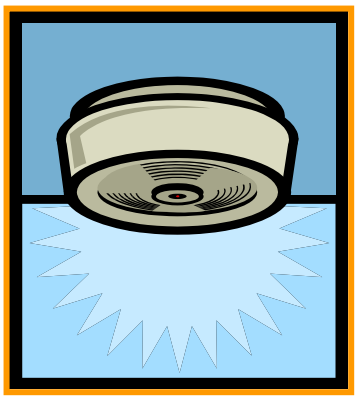
The main requirement on employers is to carry out a risk assessment. Employers with five or more employees need to record the significant findings of the risk assessment. Risk assessment should be straightforward in a simple workplace such as a typical office. It should only be complicated if it deals with serious hazards such as those on a nuclear power station, a chemical plant, laboratory or an oil rig.

2.5.5 The Workplace (Health, Safety and Welfare) Regulations 1992

These regulations deal with preventing hazards that result from poor housekeeping, which includes cleanliness and waste materials. We must not allow waste materials to build up because they might create slipping or tripping hazards or cause an obstruction to fire exits and fire doors.

In addition, these regulations require us to maintain the fabric of the workplace, to provide suitable ventilation and lighting, to carry out space planning and to provide washing facilities and changing rooms. In this context, we should be aware that ‘the workplace’ does not just include buildings; for a truck driver, the workplace can be the truck itself.





2.5.6 The Provision and Use of Workplace Equipment Regulations 1998 (PUWER)

These regulations require employers to ensure that the equipment they provide for use at work complies with certain requirements.(if employees are allowed to provide their own equipment, this too will have to comply with PUWER). This would include, for example, Mechanical Handling Equipment (MHE), chairs, staple guns, desks and vehicle jacks.

Work equipment must be:

- Suitable for the intended use
- Safe for use, maintained in a safe condition; and
- In certain circumstances, inspected to ensure this remains the case
- Used only by people who have received adequate information, instruction and training; and
- Accompanied by suitable safety measures, e.g. protective devices, markings and warnings

2.5.7 The Manual Handling Operations Regulations 1992

The regulations require employers to:

- Avoid the need for hazardous manual handling, so far as is reasonably practicable

- Assess the risk of injury from any hazardous manual handling that can't be avoided; and
- Reduce the risk of injury from hazardous manual handling, so far as is reasonably practicable

As employees we have have duties too. We should:

- Follow appropriate systems of work laid down for our safety
- Make proper use of the equipment provided for our safety
- Co-operate with our employer on health and safety matters
- Inform the employer if we identify hazardous handling activities
- Take care to ensure that our activities do not put others at risk

2.5.8 The Health and Safety (Display Screen Equipment) Regulations 1992 (DSE)

These regulations apply to visual display units (VDUs), wherever they are used. This might include computer screens, oscilloscopes or microfiche readers, for example. The regulations require employers to minimise the risks associated with the use of VDUs, which are mainly eye strain, backache and limb pain. They must provide training for everyone involved and the equipment they provide must be adjustable to suit each individual at the workstation. This includes the ergonomics of the workstation layout.

2.5.9 The Personal Protective Equipment at Work Regulations 1992 (PPE)

Employers must provide PPE where there are risks to people's health and safety that they cannot control by other means. We can describe PPE as any equipment designed to be worn or held by the person to protect them from one or more hazards. This could be simply gloves, goggles or warm clothing. PPE is often described as the solution of last resort, because it does nothing to reduce or eliminate hazards.

The regulations also require that PPE:

- Is properly assessed before use to ensure it is suitable
- Is maintained and stored properly
- Is provided with instructions on how to use it safely; and
- Is used correctly by employees

Other important regulations that have been drawn up since the 'Six Pack' was introduced and that are also relevant to logistics operations include:

Task 2.7

What are the four requirements in respect of protective equipment necessary under PPE? Consider how these requirements are similar to requirements for your organisation's operations in a country of your choice.

2.6 Risk Assessment

A risk assessment is simply a careful examination of what could cause harm to people. in the work place. We can then consider whether we have taken sufficient precautions or whether more should be done to prevent harm. The process should not be made too complicated and in many organisations the risks are well known and the necessary control measures easy to apply.

We will not prescribe any particular way in which to carry out risk assessments. This is easy to understand when we consider the great diversity of situations in which risk assessment might be undertaken. For example, a risk assessment undertaken on a North Sea oil rig would be a vastly different affair from that undertaken in a corner shop.

The HSE (UK) advises that there are five steps to be taken in risk assessment. These are:

- Identify the hazards
- Decide who might be harmed and how
- Evaluate the risks and decide on precaution
- Record findings and implement them
- Review assessment and update if necessary

Before we start to look at risk assessment, we need to define two important terms:

- **Hazard**: We can define this as something with the potential to cause harm. Examples might include a knife, oil spilt on the floor, a bottle of bleach or a damaged electrical cable
- **Risk**: We can define risk as the likelihood that a hazard will actually cause harm

If we were to look at one of our hazards – the bottle of bleach – we can see that this is a dangerous substance. However, if we keep the bottle of bleach in a locked cupboard, we have reduced the risk that it will cause

harm, simply because it is more difficult for anyone to gain access to it. We should note that our action has done nothing to reduce the hazard – the bleach in the locked cupboard is just as dangerous as it was before. We need to note that risk has two components:

- **Frequency**: How often a hazard will occur. An oil spill on the front steps of a building will put everyone who enters or leaves the building at risk; an oil spill in the basement would affect fewer people.
- **Severity**: If the hazard does cause harm, what is the likely outcome?. Touching a damaged mains electrical cable could be fatal; touching a damaged electrical cable on a computer mouse would hardly be noticed. While there is no general formula for assessing risks, a simple technique can help our decision making. This involves rating the two components of risk: frequency and severity. We could, for example, rate the frequency of a risk:

3	High	Where it is certain or near certain that harm will occur
2	Medium	Where the risk will often occur
1	Low	Where the risk will seldom occur

In the same way we could, for example, rate the severity of a risk:

3	Major	Death or major injury (as defined in RIDDOR) or illness causing long-term disability
2	Serious	Injuries or illnesses causing short-term disability
1	Slight	All other injuries or illnesses

We can define our risk as the combination of the likelihood of harm with the likelihood of its occurrence, or:

Risk = Severity of harm x Likelihood of occurrence

If we were to use this system to assess the risk from our bottle of bleach, we might find a result like this:

Location	Frequency	Severity	Calculation	Rating
Out of cupboard	3	2	3x2	6
In cupboard	1	2	1x2	2

This simple sum enables us to make a fair comparison of our risks. If a hazard could affect more than one person, we could assign a relative weighting to reflect this. Where hazards are concerned there is a hierarchy of action we could take:

- **Elimination**: This is the best solution of all. If we eliminate the hazard we also eliminate the risk. However, this is not always possible: battery acid is dangerous but we need a battery in every vehicle
- **Substitution**: Here, we replace one hazard for a lesser one. We can often make this work with chemicals. If we substitute our bleach with another cleaner that is not based on bleach, we have reduced, but not eliminated, the hazard
- **Isolation**: If we have a hazard and we segregate it from our workers by some sort of barrier, we have reduced the risk but we have not affected the hazard. This is what we did with our bottle of bleach
- **Administration**: We can devise procedures and safe working practices that will prevent hazards from causing harm – as long as people follow the procedures
- **Use Personal Protective Equipment (PPE)**: This is just about the last resort. We have done nothing about the hazard and we have no

way of making sure that the person will work safely. We should only use PPE after we have reduced the hazard substantially by using all the other alternatives

We should understand that harm may not arise from exposure to a hazard on every occasion. In practice, the likelihood and severity of harm will be affected by how the work is organised, how effectively the hazard is controlled, and the extent and nature of the exposure to it. In the case of health risks, the latent effects and the susceptibility of individuals will also be relevant.

Our judgement about likelihood and severity will also be affected by our experience of working with a hazard. For example, if we carry out an analysis of our accident, ill health and incident data, we may ascribe different values to our frequency and severity ratings. However, we must be on our guard against becoming complacent about our hazards.

Our system of assessing relative hazards and risks can contribute to our decisions about our priorities. They are also a useful aid to help us answer urgent and important questions when we are planning and implementing a health and safety management system. They can, for example, help us to:

- Prioritise different health and safety objectives
- Decide on the hazard profile of our business to reveal those areas where we will need more robust and reliable Risk Control Systems (RCS)
- Decide our health monitoring priorities
- Establish priorities for training and improving levels of competence
- Decide what immediate action we need to take to prevent further injury
- Decide what immediate action we need to take to prevent injury following an incident or the discovery of a hazard
- Review the results of our monitoring activities and the results of injury, ill health and investigations

- Decide the extent of the resources we need and the speed of the response that we should make following a particular accident or incident

Task 2.8

Undertake a ‘Risk Assessment’ on your own job. (You might wish to keep your manager/supervisor informed!)

3. The Role of Communications Technology in Context

3.1 Learning Outcomes

When you have completed this section you will be able to:

- State the difference between data and information
- Explain the elements of ICT
- Explain operating systems for your own organisation
- List some common applications used for ICT
- Explain E-Business
- Define data security arrangements for your organisations
- Describe data confidentiality
- Explain what 'Display Screen Regulations' are

3.2 Introduction

Computers have been one of the major forces for change in the last few decades. They are now so commonplace in organisations that they are taken for granted. Yet for all their capabilities and complexities they can do little by themselves and remain simply an operational tool. They are there to help us perform those functions that ultimately enable us to meet corporate objectives. However, precisely because of their wide-ranging applications, we are in danger of placing too much reliance on them; instead of being a tool driven by us, they become our masters.

Consider what happens when our computer system crashes! Just as computers deal with our data, telephone equipment takes care of our communications. In many cases they are interconnected. Information and communication technology (ICT) is any electronic processing that we use to collect, analyse, evaluate and transmit data. We process the data in digital form. Such data can be easily, quickly and accurately transferred and shared between one point and another. ICT is seen as a vital element of any organisation.

3.3 The Difference between Information and Data

We often substitute these two terms (incorrectly) for each other, but they have different meanings.

- **Data**: This is the basic numbers, words, etc. produced by the IT system. In itself, this data is not very useful. For example, 17 is a piece of data, but it is useless as a piece of information because it doesn't tell us anything – it could equally refer to bananas or bus stops
- **Information**: Information is data that has been:
  - Sorted and ordered in an appropriate way
  - Placed into a context

So, 17 miles per gallon would tell us much more about the piece of data because it has a context. In management terms, we may present information at a number of levels, so the final use of our information might be: 'Of the ten vehicles in our fleet, the average fuel consumption is 17 mpg'. In essence, we can say that information is data that has been analysed into context, applicability and usefulness.

Data management is the process of turning raw data into useful information. Data management does not apply only to electronic data, but we will use it as such in this section. We should note that we have to produce most electronic data as visual material (on a screen or printed) before we can really use it ourselves. However, the data itself can be used directly by another piece of IT equipment.

3.4 Hardware and Software; Hardware, Software, Systems

Hardware and software are the two main sub-technologies that make up information technology. We can define them as follows:

- **Hardware**: This is the physical part of the computer and those devices connected to it, such as printers and scanners

- **Software**: This consists of the computer programs written to make the hardware work. Different software programs allow us to carry out different tasks on our computer

3.5 Operating Systems

3.5.1 Windows and other Operating Systems

Just as there are different types of hardware, so there are different types of software. The most important of these is the operating system (OS). No computer can work unless it has an OS to carry out all our background tasks such as managing our files, displaying documents on our screen, and printing them. One of the problems with computers is that they often do not speak the same language, which makes it difficult for them to communicate with one another. The main reason for this is because we have developed different operating systems over the years. The first computer operating system was UNIX, which was originally developed for databases and network sharing in the early 1970s.

Many logistics companies and manufacturers use systems based on UNIX. Unfortunately, UNIX is not very easy to use and this encouraged the development of more user-friendly operating systems that had a Graphical User Interface (GUI), consisting of pictures and a pointing device – the mouse. The most common OS in use today is Microsoft Windows and many of us will be familiar with it. Not the first OS to have a GUI, Windows has been more successful than any of its rivals. This has benefited software developers who prefer to use only one operating system as it makes their job simpler. Part of the reason for the continued success of Windows is the vast amount of software available to run on it; much of which we can use in a business environment. A downside of Windows was that it was primarily a single-user operating system designed for PCs and, because of this, early versions did not have strong network security built in.

More recent versions of Windows, particularly the NT range, do have good network security. The problem is that not all software and hardware will operate correctly on a system running Windows NT. The universal

success of Windows is something that the developers of UNIX systems have never really achieved.. The Apple Macintosh is based on UNIX and recently has made inroads into the market and is highly favoured for graphic applications.

One last problem we should mention is one caused by the virtual monopoly created by the use of Windows. In particular, we should be aware that:

- There is a lack of competition between operating systems
- The widespread use of Windows makes security more difficult
- Viruses are easily written and quickly spread

Task 3.1

Write short notes on Operating systems (OS).

3.6 Common Applications

Application software is the name we give to those programs that we actually use to create a document on our computer. Our document might be as simple as a letter or as complex as an architect's drawing, but we produce each of them using a different application. Perhaps the most widely used application is Microsoft Office (MS Office). The professional version of MS Office contains other applications, namely;

- Microsoft Office
- Microsoft Word
- Microsoft Excel
- Microsoft PowerPoint
- Microsoft Access

- Microsoft Outlook

Some of the more important uses are considered below:

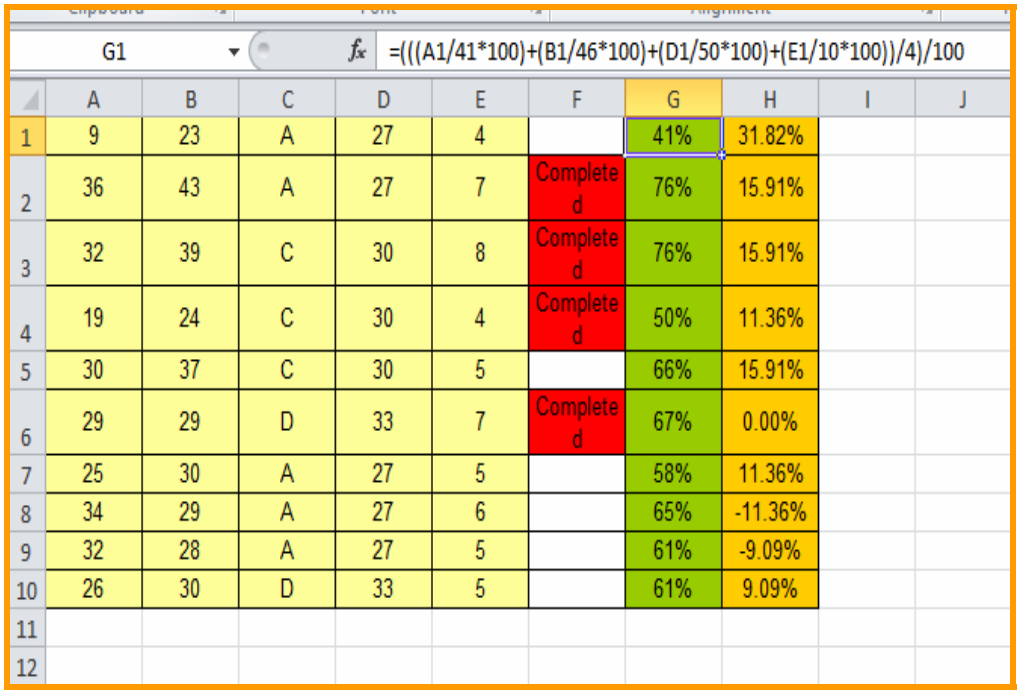
3.6.1 Word Processing (WP)

Word processing packages, such as MS Office, are a feature of almost every office and have made earlier technology, such as typewriters, virtually obsolete. When we use WP we can key in text, print out a hard copy, perform editing functions such as moving text from one location to another, copy and insert standard wording, and a host of other tasks. The most useful feature of word processing is its editing features and the ability to cut, copy and paste text. More advanced WP packages offer us many more functions and features.

These may include predesigned templates for letters, faxes and invoices, as well as tools for importing text and graphics produced in other applications. Additionally, we can add extras such as headings, tabs, footnotes and page numbers to our document. We can also carry out spelling and grammar checks and tasks such as mail merging, where we combine two documents into one.

3.6.2 Spreadsheets

A spreadsheet is an electronic grid for numbers that enables us to prepare and present numerical information. The program (for example, MS Excel) allows us to make calculations, use formulae and modify the results to view different scenarios. In essence, a spreadsheet is an electronic ledger (see Fig. 3.1 below). It incorporates routines designed to automate numerical calculations.



G1 | =(((A1/41*100)+(B1/46*100)+(D1/50*100)+(E1/10*100))/4)/100

	A	B	C	D	E	F	G	H	I	J
1	9	23	A	27	4		41%	31.82%		
2	36	43	A	27	7	Completed	76%	15.91%		
3	32	39	C	30	8	Completed	76%	15.91%		
4	19	24	C	30	4	Completed	50%	11.36%		
5	30	37	C	30	5		66%	15.91%		
6	29	29	D	33	7	Completed	67%	0.00%		
7	25	30	A	27	5		58%	11.36%		
8	34	29	A	27	6		65%	-11.36%		
9	32	28	A	27	5		61%	-9.09%		
10	26	30	D	33	5		61%	9.09%		
11										
12										

Figure 3.1: Spreadsheet Example

We can key data into the spreadsheet in the form of text, values or formulae. For example, if we are interested in the amount we should spend on purchasing a particular product, there are two items of information we need:

- The quantity to be purchased
- The unit price

We can key these into the spreadsheet as two separate pieces of data. We can then enter the total cost of the item as a formula: quantity multiplied by unit price. The spreadsheet will use the data to generate and display the answer to the formula.

A great advantage of spreadsheets is the ability to model what happens if we use different data. If we were to change our mind about the quantity, or if the supplier alters his price, we simply change the relevant figure on the spreadsheet and the software automatically recalculates the total for us.

A spreadsheet may incorporate many rows and columns of information. If we change one figure, the spreadsheet will automatically recalculate all the other figures that depend on it. If we didn't use formulae, we would have to recalculate all our figures manually and enter them separately – a very laborious task. One major application of spreadsheets is to perform

'what if?' analysis where a number of scenarios can be used to see what happens when we input different data. An example here might be to look at our company's balance sheet and see what would happen if our bank's interest rate were to increase by 0.25% or decrease by 0.50%.

At any point in our analysis, we can print out our spreadsheet to provide a paper copy. Moreover, a typical spreadsheet package will incorporate many ways to improve the clarity of our communication. For example, we could display data on sales values over the last twelve months as a table or as a graph. Spreadsheets are very useful analytical tools and we use them to monitor and control budgets, calculate costs and for any other activity that involves manipulating numbers.

3.6.3 Databases

More than 99% of business data is usually held on one or more databases. In terms of their importance to the business, they are, therefore, at the very top. Databases are very similar to spreadsheets, except that they do not have grid references, but records and fields instead. If we were to look at a spreadsheet, the columns would represent the fields and the rows would represent the records. If we think of spreadsheets as ledgers, then we can think of databases as card index systems. The main advantage of electronic databases is that we can select the data we want to look at, sort it into the correct order, and format it in a way to suit our purpose. This could be printing the results as a report or viewing the information across a network.

Many smaller business systems are developed around stand-alone programs such as MS Access. These are powerful tools that will allow us to build quite sophisticated systems, but we will require some training to use them effectively. Many organisations forbid the use of office-written databases for business-critical functions (those such as, say, the invoicing system). They do this to prevent us from changing what might be a vital database used in our business system.

3.6.4 Presentation Programs

We can use programs such as MS PowerPoint to assist us when making presentations – and as teaching aids. They specialise in producing text and graphics in a form that we can project, print or transfer to overhead transparencies.

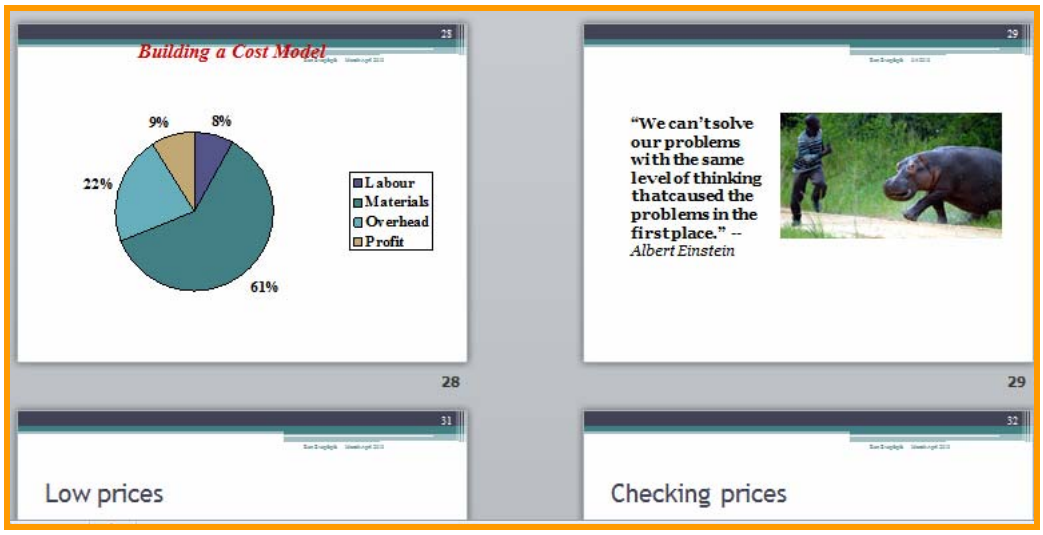


Figure 3.2: PowerPoint Slide Sample.

We can create professional multimedia presentations with video, sound and music – quickly and easily. Additionally, we can use presentation programs with an LCD projector and sound system and turn our computer into a multimedia slide projector.

3.6.5 Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM)

CAD programs allow us to create complex technical drawings such as a 3D representation of a building. These programs have effectively replaced the manual drawing board. We can use CAD for designing products such as cars and clothing. By using the Internet, we can undertake design on a worldwide basis. This enables interactions over large distances in real time. An example of successful CAD sharing is when we allow a product to be developed on both sides of the Atlantic at the same time. This gives us the benefits of two creative perspectives and two time zones, which enables the working day to be extended.

Once we have agreed the final design we can link our CAD system to a CAM program that will carry out highly accurate manufacturing. For example, if we used traditional design methods to create a new aircraft engine turbine blade, the job may take up to six months of drawing, calculating and template making. With a CAD/CAM system, an engineer can design a blade in the afternoon and watch its mould being machined the next morning. This gives us enhanced productivity, better quality and reduced cost per unit of production.

Above all, by using these systems we save time, which means that our time to market is faster. We might even make reductions in our time to market from months to days. This is important; not only for fashion-based products but also for customer service in a world that increasingly requires goods, material, people and services yesterday.

3.6.6 Desktop Publishing

When word processing was introduced, it was only able to handle text. However, some industries, notably the printing industry, needed to mix text with pictures and have complete control over things like colour and the position of text and pictures on the page. This led to the development of desktop publishing (DTP) applications, which were designed to integrate text and graphics much more accurately than WP. Modern DTP applications can import documents from a huge range of formats and can even handle sounds and movies. Although very similar to WP, DTP takes the process to a much higher level.

3.6.7 Graphics, Media and Music Packages

We are able to use graphics programs to create and manipulate pictures and drawings. We can create pictures and drawings in the graphics program or we can import them through a scanner or other device such as a digital camera. Graphic programs offer us a multitude of image editing facilities such as colour, brightness, contrast controls and cropping. We can also stretch, invert, zoom and resize our images. Graphics programs can give us a visual representation, which can enhance or replace words. Media programs allow us to present and manipulate video images. In the general business environment, they are most likely to be used in sales or as part of the development of presentations.

3.6.8 Applications Relating Especially to Logistics

Having looked at some of the more general applications, we now consider briefly some that are found supporting logistics systems. Major business systems such as SAP and Oracle are database driven but, as users, we see them as a program rather than a database.

3.6.9 EPOS

Electronic Point of Sale is the transfer of structured data by agreed message standards from computer to computer. It relies on bar coding and we will have seen it in use for a number of years at the 'check-outs' of most supermarkets. Up to the minute data can freely flow to all participants in the supply chain, through EPOS. This can lead to automatic replenishment and provide timely and accurate financial figures concerning the scanned item.

3.6.10 RFID

Radio Frequency Identification tags contain a silicon chip that carries an identification number and an antenna that transmits the information to a reading device. They are likely to replace bar codes as they become cheaper with the advances in technology. They have many advantages over bar codes.

3.6.11 Paragon

This is a commercially available software system widely used in the transportation industry. It provides optimisation solutions for routing and scheduling, resource management and transport execution. The flexible software solutions are all focussed on using advanced technology to enhance transport operations. The software is used across a wide range of logistics and service industries, covering business to business (B2B), business to consumer (B2C) and consumer to business sectors.

3.6.12 SAP

This is a comprehensive system used worldwide by companies to manage a wide range of logistics activities such as inventory control, production and materials planning, and customer relations management.

3.6.13 Oracle

Oracle is another widely used system. Like SAP, it covers matter such as:

- Financial management
- Asset lifecycle management
- Project management
- Supply chain management (customer orders, logistics, manufacturing and planning)
- Customer relationship management
- Supply management
- Application technology
- Corporate performance management

The table below illustrates the use of various types of software:

Software	Use
Word Processing	Widespread in almost every office and business environment. Links easily to email. Simple to learn and develop
Spreadsheets	Widespread where mathematical data is required. More time taken to learn than for word processing. At higher levels, some mathematical ability is needed
Databases	Very common in businesses. They can do some basic functions. More complex uses are often designed by specialists
Presentation Programs	Widely used in training, sales and marketing. A powerful tool when used appropriately
CAD/CAM	Widespread in design, engineering and production. Can require specialist training in the operation of systems
Desktop Publishing	Used where greater control over the printed page is required. You are currently reading a document that has been created by such a program

Graphics, Media and Music packages	Limited use in logistical businesses but common in specific areas such as music and media
Logistics orientated. EPOS, RFID, Paragon, SAP and ORACLE	Widespread use throughout logistics. EPOS is found in virtually every supermarket and large retail shops. RFID is being used more widely in warehousing and distribution, but cost and other difficulties are constraining universal use. Paragon is used throughout the distribution industry. SAP and ORACLE are widespread throughout logistic businesses

Table 3.1 Various Types of Software

Task 3.2

Explain, in your own words, the following:

a. RFID

b. Paragon

c. SAP

d. Oracle

3.7 Technology in Communication and E-Business

Technology has allowed communication to change significantly, with implications for the way we carry out our business. This has been driven by PCs, the Internet and mobile phones. Mobile phones and laptop computers are replacing land-based systems. We can contact almost anyone, anywhere. Furthermore, we are increasingly able to exchange drawings, documents and pictures in exactly the same original quality, provided all our systems are compatible. Email is electronic mail communication from one computer user to another. The sender and recipient may be anywhere in the world but must both have a PC and a

connection to the Internet. The transfer of email is virtually instantaneous, although servers may delay it for very short periods of time.

3.7.1 Email

This combines the best features of a written letter, the telephone call and the fax. It has virtually replaced letter and memo writing. It is cheap, quick and easy to use. It has a global reach, with virtually 100% reliability. An important feature is the ability to attach files to an email. This allows us to transmit a document or a picture instantly. However, email can suffer from some problems:

- Security – it is not secure; it is the electronic equivalent of a postcard and is a common carrier of viruses
- Overuse – increasingly, people are swamped by emails as it is so easy to include people as 'copies to'. Some managers often spend most of their day answering and dealing with email, which takes them away from their core activities

- Language – emails tend to be composed quickly. To avoid subsequent errors, we should spend more time with composition to convey the right meaning
- Impersonal – it does not encourage face-to-face contact
- Time wasting – personal use of email by employees

3.8 E-business

E-business refers to commercial transactions that are based upon the processing and transmission of digitised data. This data can be text, sound or pictures that are either carried over the Internet or passed through to closed networks such as intranets and extranets. Increasingly, we use e-business as an umbrella term for most Internet business. It includes activities such as purchasing and buying, marketing and selling, and almost every other business activity.

E-business allows us to use the convenience and availability of ICT, allied to worldwide communications systems such as the Internet, to improve and to change the way we do business. It is a rapidly growing area and estimates have suggested that 25% of all business will be e-business by the early part of the 21st Century. The advantages of e-business have been identified as follows:

Advantage	Description
Market share	Increased potential market share. Access is worldwide; however, in practice there can still be restrictions such as delivery costs, warranty and service claims, and currency issues
Lower operating costs	No retail shops or sales force is needed; however, there must be a good logistics partner for efficient delivery
Speed	Using electronic communication can reduce the time taken to process orders through the system; note, however, that systems are vulnerable to power and systems failure, and viruses
Simplifying and reducing paperwork	From the business point of view this is true; however, the customer may still have to spend time filling in online forms
24/7 trading	The fact that the Internet never closes allows people to buy and sell at any time of the day or night, every day of the year

Table 3.2 Advantages of e-business

Traditional companies such as banks, booksellers and CD retailers are already testimony to the rapid growth of e-business. These and many other products are now widely sold anywhere, any time via e-business. This has, in many cases, removed the traditional business and commercial links that existed before.

Task 3.3

Email experiences a number of problems. Write short notes on five of them.

3.8.1 Networks

There are various ways in which we can connect computers so that they can communicate with each other. The most important of these is the Internet, which as we have noted is the extension of networked computers on a global scale, connected through the global telephone system. The Internet grew out of a collection of independent networks (just as supply chains grow out of independent logistics operations).

These networks were linked and grew rapidly as companies took advantage of the global speed of communication. As it grew, however, problems appeared about different methods of communication. The need was for a standardised environment.

This resulted in the creation of the World Wide Web, a medium for using electronic pages of text and images to represent a magazine format. The Web took email into a different league, providing instant communication anywhere in the world at local telephone call rates. We can create our own website, which is, effectively, a means of publishing information electronically. Education and business especially use this medium for selling, publishing and communicating. Examples include freight exchanges, air ticket purchases, holidays and books.

There are many millions of websites worldwide and looking for something specific in this colossal mass of data can be difficult. We need search engines to help us with the task. These are huge databases that contain

references to millions of websites by using keywords. When we enter a keyword, the search engine responds by displaying all the pages on all websites it knows about that contain our keyword. The result can be literally millions of different pages! We can then access the websites that we think are most likely to contain the information we need.

A key feature of the Internet is its use of hyperlinks, which are areas or words on a Web page that allow us to jump to another part of the Web page, or even to another website.

We need an Internet Service Provider (ISP) to access the Internet. An ISP provides the interface between our network and the Internet and creates a telephone link that connects us with all the resources of the Internet. Some disadvantages of using the Internet are:

- As a library it is unstructured; this often makes it difficult to access the information we need
- Lack of control means that junk mail and dubious sites are very intrusive
- Viruses are easily and quickly spread
- Some websites may contain out-dated information

The Internet is an open network, which means that anyone can have access to it and use its resources. In contrast, there are closed networks. Two examples of closed networks are:

3.8.2 Intranets

Intranets are networks that are limited to authorised users within a company – they are accessed only by employees. However, they look and work exactly like miniature versions of the Internet and have similar features such as email and the ability to carry out searches.

3.8.3 Extranets

These are very similar to intranets but we have extended their use to nominated users outside our company. This might include, for example, our suppliers, partners and customers.

Task 3.4

Write short notes on Networks.

3.8.4 Business to Consumers (B2C)

This allows individual consumers to deal directly with the suppliers of goods and services. We also refer to B2C as ‘e-retail’, because our customers can now ‘pull’ goods and services exactly when they want and need them; they can order twenty-four hours a day, seven days a week. Customers like these expect quick delivery and lower costs. As they expect quick delivery, poor or bad service becomes very visible.

Such changes in requirements and expectations present us with a real challenge. It is sometimes said that we are moving from a supply chain ‘push’ system, to a more customer-controlled demand ‘pull’ system. In other words, instead of us pushing products in the direction of customers, through intermediaries like wholesalers and retailers, customers are pulling products through the system when they require them. This has been made more possible through e-tailing technologies.

3.8.5 Business to Business (B2B)

This trading provides a two-way link between company buyers and suppliers. Suppliers are able to advertise products and services whilst buyers can order or take part in auctions or online tenders. As a buyer, we

can find alternative suppliers just a click away. We can easily make price comparisons, and geographical distance loses much of its significance. As a supplier, orders are mainly automated. We have access to new markets and we can notify changes to products quickly. For both suppliers and customers, order costs are reduced. A conservative estimate is that to place a traditional order costs $70.00-$200.00 With e-business, this falls to less than $14.00 – a significant saving for many companies once they have removed the actual components of cost (for example, staff and accommodation).

E-business is an area of rapid technological change. Much of the current personal PC and mobile phone market is a result of satisfying consumer needs for status and fashion. Future developments in this area include m-business, which is e-business conducted through mobile phones. At the moment, mobile phones are generally slow when transferring data, but this is changing. This does not mean, however, that we will not need human intervention and skills. All of these processes are very dependent on how people set them up and operate them. A single data error in a field, such as a delivery date, will cause many problems for both the operator and customer.

The culture of working habits also has an effect on the success of important logistics software. If our motivation is poor, our data entry into databases will often be inaccurate, which will give incorrect information to other parts of the system. When we are planning changes to our operating procedures, we must seek input from all operators, especially when the procedures are computer based.

Task 3.5

Explain the differences between B2C and B2B.

3.8.6 E-Business Issues

E-business raises a number of issues that may affect the way our organisation operates, and we need to be aware of them:

- **Removing Outlets**: One result of e-business is that it impacts on our supply chains, often removing whole links. We must make sure that these links are replaced or our supply chain will fail. Traditional shops have become far more than just a point of sale, and the appearance and general ambience of a shop is an important factor in its success. If we replace this by a website, we must make the e-business process as agreeable as possible. In particular, our website must be attractive, easy to use and always available. If we want our website to attract random business, then we must make sure it figures in the top twenty sites thrown up by search engines. This is becoming increasingly difficult and expensive. We also have a problem with service backup. Being a global 24/7 system, we must provide 'round-the-clock' service for any customer who needs help with an online problem. It is easy for customers to click off and not return if they are not satisfied with our service
- **Reducing Stock**: When we reduce store outlets and regional distribution networks, it will inevitably mean that we reduce the amount of stock we hold. However, we must make certain that we still hold sufficient stock to meet our customers' expectations
- **Delivery**: E-business is likely to have a huge impact on traditional delivery patterns. The most significant changes are likely to come in the size of our deliveries and the number of destinations. Before e-business, we were able to deliver in bulk to regional warehouses and high street shops; now we have to deliver a single item to an individual address. This requires a different set of distribution skills

Some of the other issues raised by the use of e-business include:

- Contractual Issues. E-business raises contractual issues, as the normal documentation is now absent. This can create problems when trading on an international basis

- Electronic documentation currently has no acceptable signature verification or authorisation for normal transactions
- Traditionally, a contract applies when the buyer accepts the seller's offer. As yet, no international rules exist to cover the acceptance of an offer made on a website. The EU (European Union) is looking into the problem and will produce new rules

3.8.7 Customer Interaction

Our customers are able to access information more easily in e-business. They can request 'self-service' and can buy from a wider geographical area. This may expose our supply chain to new demands and to new levels of security. Examples of the issues we must consider are: online order systems, speed of delivery, range availability, value for money expectations, and order status transparency.

3.8.8 Accuracy

Our customer is now more in control of the buying process, and any shortfalls in our delivery system become very visible. Our ability to offer additional value-added services could be important here. These might include: real-time and accurate inventory information, keeping our promises on delivery, running to timetable, and picking orders in real-time.

3.8.9 Flexibility

The e-business supply chain needs to be designed with flexibility in mind. We may find that customer demand patterns are more erratic and uncertain than before. If, for example, our customer demand rises, can we increase our pick rate accordingly? If our customer demand drops, can we afford to have people standing idle? One solution may be to use staff outsourcing to cover peak periods but whatever we do, we must remain in control – as far as the customer is concerned, accountability still rests with us.

3.8.10 Managing Returns

Few traditional businesses expect products to be returned from customers, although this is much more common through retail outlets. E-business resembles traditional mail order business and experience shows us that catalogue retailers can experience 30% return rates. With online transactions, our customers do not have the opportunity to try goods out, to fit clothes or even to simply accept that the physical properties of the goods are acceptable. As a result, our return rates are likely to be high. This raises issues about:

- Goods-in ability to deal with increased receipts
- Dealing with damaged returns
- Recycling
- Returning products back into stock
- Ensuring invoices are correct

3.8.11 Expectations

Customer service expectations are higher online than with many other forms of business, as the convenience of the direct contact puts the customer in direct control. When we make promises to our customers we need reliable and accurate data. This means we need to have an effective ICT system and an effective logistics operation. Logistics and supply chain management are vital ingredients in successful e-business.

3.9 Principles of Data Security and Confidentiality

When we store or transfer data electronically, we need to categorise it to determine why we are holding it. We need to do this to see whether we ought to apply any level of security and confidentiality to it. Documents that have relevance are:

- **ISO 17799**: Initially developed from BS7799-1, ISO 17799 is an international standard that sets out the requirements of good practice for Information Security Management
- **ISO 27001**: This defines the specification for an Information Security Management System (ISMS). It was developed from BS 7799 Part 2. The scope of any ISMS includes people, processes, IT systems and policies.

We need to consider a number of issues about security and confidentiality and these are shown in the table below:

Issue	Description
Basic 'good housekeeping' of data	It is easy with electronic data (especially PC-based data) to copy and file it in the wrong folder, making retrieval difficult. Data that cannot be found is data that does not exist! As with paper-based systems, filing should be structured and understood by users. This aspect is often overlooked in many business operations
Internal data security	Making sure that data is controlled inside the business in such a way that staff can access only what they need
External data security	Making sure that data inside the business cannot be accessed from outside, either accidentally or maliciously
System security	As well as controlling access to data, the entire system can be at risk if unauthorised staff or outsiders can access program data. Additionally, the increasing numbers of viruses mean that virus protection is becoming a major problem for many businesses, and one that has already cost some companies large sums of money

Table 3.3: Security and Confidentiality Issues

3.9.1 Hacking

One of the threats that many business face is that of hacking. This is the unauthorised access into a computer network, often perpetrated with a

view to fraud or cause malicious damage. Many hackers are skilled programmers who are intent on showing off their skills. Hackers can cause considerable damage to business systems, as often their activities can shut systems down. Many security breaches of computer networks are from disgruntled employees. To protect our data from unauthorised access and other threats, we should consider all of the following processes:

- Good Housekeeping: This is a basic task to ensure secure, efficient and effective running of the computer system. It is often managed by a system administrator. Protection would include:
  - Clear instructions to staff on file structures and the conventions to be used
  - Regular system audits
  - The creation of a structured drive system for different aspects of the business
  - Regular 'cleansing' sessions to remove unwanted data from the system

3.9.2 Passwords

We can protect against unauthorised access by using passwords. These can be user-specific or business-specific. However, the wider a password is used, the easier it may be discovered by outsiders, and business-wide passwords only provide a limited amount of security. Typically, we might use them at the point where customers access the business, for example, at a retail outlet or customer service counter. Here, a simple password will stop members of the public accessing the system. There are some simple rules on passwords:

- We should change them periodically. The frequency of change will depend on the sensitivity of the data protected
- They should be unique. We should not use our initials, date of birth or car number, or any other name or number that other people might easily guess

- We should log them through the system administrator so that others can gain *authorised* access if we are away

3.9.3 Viruses

Computer viruses are small programs designed to replicate and spread themselves to other computers. In addition to infecting other PCs, the virus program could do a number of things such as destroy vital data or system files. We must make sure our systems are protected as viruses have become a major problem. The use of email and the Internet has allowed instant worldwide communication, and many viruses are transmitted as email attachments. Viruses are a nuisance. They continue to provide serious problems and waste IT staff time in removal and system cleansing. They can also cost companies large amounts of money. There are a number of things we can and must do to prevent virus intrusion:

- We must use up to date virus protection software. This will detect viruses and remove them
- We must have procedures in place to tell people what to do if viruses are identified
- We should regularly back up our data (see below for more details)
- We should discourage people importing data from the Internet or from unauthorised files and disks

3.9.4 Additional Security Levels

If we are going to transfer money via the Internet, secure protocols are available. These ensure that all details of our credit cards are kept safe. Here are some straightforward questions that we should ask about security and confidentiality:

- Does each user need to have authorisation?
- Will user passwords be sufficient?
- Are other certifications (such as tokens) needed before allowing access?
- Is encryption (such as Secure Socket Layer) needed?
- Does it need to cover all the data or can access be selective?

3.9.5 Data Back-up

Our first line of defence on all computer systems is to back up data, and most of us have at some time wished we had backed up before our system crashed. A back-up is a copy of significant data, taken on a regular basis, which allows a crashed system to be restored to the point at which the back-up was taken. Originally, backups tended to be weekly or daily copies of the system held on tape. Today, they are usually the responsibility of the administrator and may be automatic routines.

One strategy we might adopt is to back up our system daily and weekly and to remove the back-up storage device (the tape or disks) from the building. A back-up strategy like this will give us added protection from fire risks or multiple failures. Clearly, the safety of the back-up data copies is important. If we keep them, for example, in our desk drawer we are not going to get sufficient protection if the building catches fire.

Individually, on our personal computers, it is worth getting into the habit of making regular back-ups. We can do this easily by saving data onto a network drive. When finishing work for the day, we can make another copy onto one of the many devices available, such as external hard drives and disks. If we keep the back-up disks or devices separate from the personal computer, our work will be safe. Stand-alone users should consider using similar devices.

At a company level, many consider that the loss of data that was not backed up by individuals is sufficient reason for disciplinary action. We need to ensure that we do back-ups onto a secure storage device so that,

in the event of accidental or deliberate damage, the loss of work is minimised.

Most businesses are now very reliant on computers and electronic systems. By being aware that 'if it can go wrong, it will', we can ensure that adequate back-up is available and that we back up systems and processes on an ongoing basis. Additionally, we should have plans in place to deal with a total loss or failure of the system's operation. This might mean that we need to use alternative systems in other divisions of a company or even return temporarily to a manual system. Contingency planning will need to cover the worst-case scenario of a total loss of ICT.

Figure 3.3: Data Storage Devices

Task 3.6

Protecting the information held on computer systems is vitally important. Indicate how each type of threat shown below can best be protected against or dealt with:

a. Non-malicious loss of data

b. General security of data

c. Viruses and data corruption

d. Hackers and unauthorised access

e. System failures, fire or other disasters

3.9.6 Data Protection Legislation

In the UK the Data Protection Act (1998) is introduced on the UK Government's website as, 'An Act to make new provision for the regulation of the processing of information relating to individuals, including the obtaining, holding, use or disclosure of such information'. The act maintains that individuals have the right to privacy when data is being processed. The Act lays down eight principles that organisations must follow as data users:

- 1. Personal data must be processed fairly
- 2. Personal data must be obtained specifically for lawful purposes only
- 3. Personal data must be adequate and relevant
- 4. Personal data must be accurate and up to date
- 5. Personal data must not be retained longer than necessary after processing
- 6. Personal data must be processed in accordance with the rights of the individual

- 7. Personal data must not be transferred to any country out of the EU, unless that country has similar legislation
- 8. Appropriate measures shall be taken against unlawful access

The Act covers not only how data is manipulated, but also how it is obtained, maintained, recorded, held and destroyed. Further details are available from the Government at www.opsi.gov.uk/acts/acts1998. Originally, it was not clear as to whether hacking could be regarded as a crime because often the hacker did not steal any data. To counter this threat and to make it clear that hacking is indeed a criminal offence, the Computer Misuse Act was enacted in the UK in 1990. It created three new offences:

- Unauthorised access to computer material
- Unauthorised access, with intent to commit further offences
- Unauthorised modification of computer material

3.10 The Health and Safety (Display Screen Equipment) Regulations

These came into force in the UK on 1st January 1993 (some minor changes were made in 2002), and seek to protect the health of workers by reducing risks from VDU work. These regulations set general requirements in three main areas:

- **Equipment**: The screen, keyboards, desks and chairs
- **Environment**: The space, lighting, reflection and noise
- **Interface**: The ergonomics, software and system

They require employers to:

- Analyse workstations to assess and reduce risks
- Ensure workstations meet specified minimum requirements
- Plan work activities so that they include breaks or changes of activity

- Provide eye and eyesight tests on request, and special spectacles if needed
- Provide information and training

As noted earlier in the UK, the general provisions of other health and safely legislation will also apply, such as the Health and Safety at Work Act itself. This is particularly important where cables and wiring connections around computer workstations may pose a trip hazard.

Task 3.7

What are the three main areas covered by the UK Health and Safety (Display Screen Equipment) Regulations? How do these areas apply to your organisation's ICT use?

4. Sustainability and the Environment

4.1 Learning Outcomes

When you have completed this section you will be able to:

- Define sustainability
- Describe environmentally acceptable ways of working in your work place
- Explain current sustainability considerations and challenges for logistics operators
- State some good sustainability practices for logistics operations.

4.2 Sustainability

Sustainability is a complex subject that has been aired in the media for a number of years. It is now coming under even sharper focus as its likely impact on the world is perceived as being even more significant than previously thought. It is, however, a political topic having both strong supporters and strong opposition! As a serious element in logistics, it is a recent import despite an obvious link! A quick scan through the index of recent works on purchasing, warehousing and distribution will show an absence of this topic. This is likely to change in the near future!

In essence, sustainability is about natural resources – especially those originating from the Earth such as oil, coal, mineral ores, timber, water, fish etc.

The division of the globe into what has become known as ‘the haves’ and ‘the have nots’ may be ironic – those that have the resources do not have the wealth and those who have the wealth do not have the resources! Perhaps if we saw ourselves as all being ‘citizens’ of the world we could

then begin to regard and manage these precious resources, just as our own lives – finite.

Temple (1992) wrote:

"(The) word 'sustainable' has been used in too many situations today, and ecological sustainability is one of those terms that confuse a lot of people. You hear about sustainable development, sustainable growth, sustainable economies, sustainable societies, and sustainable agriculture. Everything is sustainable."

Let us look at what sustainability means to us in logistics industries.

4.2.1 Definition

There is no short single definition of sustainability. A typical dictionary would say something along the lines of – 'sustainable (of economic development or energy resources); capable of being maintained at a steady level without exhausting natural resources or causing ecological damage' (Collin's English Dictionary).

One that has been used widely, as at least a starting point with particular reference to sustainable development, is:

"…development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland Commission).

People's needs for resources vary and may be seen as depending largely upon the degree of development in the particular country or region. Of particular significance, however, is the realisation by scientists and others that the world is facing fundamental challenges in matters of climate change, global warming and other environmental concerns.

The sustainability of the world at current consumption rates is not, as we have seen, at all certain. Resources are being severely depleted in addition to this we have witnessed other environmental degradation that

has negative impacts on the livelihoods of people, animals and other living creatures.

We may consider resources under a number of categories. Two important ones are renewable and non-renewable.

Task 4.1

Write short notes on sustainability.

4.2.2 Renewable Resources

Renewable resources are those that can be replenished or reproduced easily. Some of them, like sunlight, air, wind, etc. are continuously available and their quantity is not affected by human consumption – at present. Many renewable resources can be depleted by human use, but may also be replenished, thus maintaining a flow. Some of these, like agricultural crops, take a short time for renewal; others take a comparatively longer time, while some, like forests, take even longer.

4.2.3 Non-renewable Resources

Non-renewable resources are formed over very long geological periods. Minerals and fossils are included in this category. Since their rate of formation is extremely slow, they cannot be replenished once they get depleted. Some can be re-used by recycling. Coal, natural gasses and petroleum cannot be recycled.

Resources have also been considered as:

- Manpower
- Materials
- Machinery
- Markets
- Money

They have sometimes been grouped together and referred to as the '5Ms'. They are all very much under the world spotlight in one way or another. For instance, a number of world organisations (essentially The United Nations (UN) and some charity organisations) are focussing on people (*human resources*) and the conditions in which they work. Other international organisations (for example International Standards Organisation - ISO) are expressing concern on the continuing use of certain dangerous and toxic chemicals (*materials*). In matters of the way

we operate equipment (*machinery*), the industrialised nations have produced significant and stringent rules for aspects of health and safety.

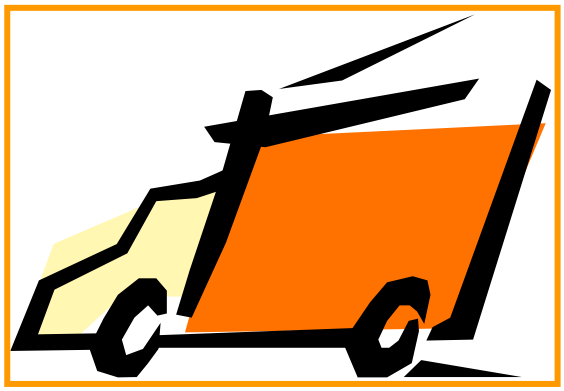
The World Trade Organisation (WTO) as a successor to GATT (General Agreement on Trade and Tariffs) has an aim that, put simply, is to ensure a level international playing field whereby countries can trade equally and fairly with one another (*markets*). Finally, we come to that which may be seen as linking the other four – *money*. The daily assertion by some is that 'the rich are getting richer and the poor are getting poorer'.

In a nutshell, if man-made and natural capital is not so easily substituted, then we have a basic reason for protecting the natural assets we have.

4.3 Sustainable Logistics Operations

Going hand in hand with sustainability is the matter of the environment. The way we work and do business greatly influences not only the physical environment but also the conditions in which workers have to operate.

We can list some of the main environmental concerns as:



- The recovery, recycling and reusing of materials and waste products
- The safe disposal of waste products that cannot be recycled
- Supplier selection policies to support firms that conform to environmental standards with regard to air, water and noise pollution
- Supplier and product selection policies that reflect concern for conservation and the renewal of resources
- The safe testing of products and materials
- Concern for noise, spray, dirt and vibration in the operation of transport facilities

Companies that have – through their own initiatives and application of good practice – have discovered a number of benefits that can be derived from paying attention to environmental matters. The potential direct benefits to businesses have been identified as:

- Reduction in resource consumption
- Reduction in scrap or waste
- Reductions in the number of complaints
- Avoidance of accidents or emergencies
- Avoidance of financial penalties
- Avoidance of claims for compensation

The potential indirect benefits have been identified as:

- Enhanced corporate image
- Enhanced marketing capabilities
- Improved staff morale
- Better customer relations
- Better community relations

4.3.1 Ethical Working Practices

Allied to caring for the environment is the matter of how we care for workers throughout the world. In the first world countries, health and safety regulations and various codes of practice generally ensure safe and healthy conditions for the operatives. Unfortunately, for many varied and complex reasons this is not usually the case in the third world countries. It is salutary to remind ourselves that in the UK the Health and Safety at Work Act only came into force in 1974.

Whilst deploring the cutting down of rain forests (on environmental and global warming grounds), to make way for more agricultural land for local workers we must also bear in mind the needs of those workers for more land to graze their livestock. Similarly, whilst condemning the practices of

using very young people to sew footballs, to halt such a practice immediately would be to remove a precious source of much needed income for a desperate family.

Other examples of unacceptable working practices are:

- Child labour
- Forced labour
- Low wages
- Poor working conditions
- Inadequate health and safety
- Intimidation of workers defending their rights

Here is what one major logistics company thought of sustainability of their operations:

- What happens inside our operational fence lines is not the only thing that matters.
- Obviously, what we do impacts our neighbours and our community, and what happens in the community, impacts our operations. Encroachment from various sources is becoming more recognised – some visible, such as urban land use and construction of wind-generated energy facilities;
- Some are not so purely visible, such as radio frequency intrusions or habitat protection requirements.
- We need to consider the competition for our operational space, for land, air, water, and electromagnetic frequency and our consumable resources in such a manner as to preserve their availability long into the future.

If all other organisations were to think and act along the same lines the sustainability agenda will produce desired results.

4.4 Current Considerations and Challenges

4.4.1 Global Warming

The major impacts and threats of global warming are widespread. Increasing ocean temperatures cause thermal expansion of the oceans and in combination with meltwater from land-based ice, this is causing sea level rise. Sea levels rose during the 20th century by 0.17 metres. By 2100, the sea level is expected to rise between 0.18 and 0.59 metres. There are uncertainties in this estimate, mostly due to uncertainty about how much water will be lost from the ice sheets. For example, Greenland is showing a rising loss of mass in recent years. The increased melting of sea ice and fresh water influx from melting glaciers and ice sheets also has the potential to influence global patterns of ocean circulation.

As a result of global warming, the type, frequency and intensity of extreme events such as tropical cyclones (including hurricanes and typhoons), floods, droughts and heavy precipitation events are expected to rise even with relatively small average temperature increases. Changes in some types of extreme events have already been observed, for example, increases in the frequency and intensity of heatwaves and heavy precipitation events.

Climate change will have wide-ranging effects on the environment, and on socio-economic and related sectors including water resources, agriculture and food security, human health, terrestrial ecosystems and biodiversity, and coastal zones. Changes in rainfall pattern are likely to lead to severe water shortages and/or flooding. The melting of glaciers can cause flooding and soil erosion. Rising temperatures will cause shifts in crop growing seasons, which affects food security. Associated changes in the distribution of disease could result in putting more people at risk from diseases such as malaria and dengue fever. Temperature increases may well potentially increase the rates of extinction for many habitats and species. It is against such a background that we should examine our subject of ‘resources’.

4.4.2 Natural Resources

In economics, natural resources are put under the heading of ‘land’, as a factor of production. It would include all natural resources like the soil, minerals, oil, forests, fish, water, the sun, and so on. The uneven distribution of natural resources throughout the world means that they can be used as economic and political weapons. Although the area of land in a country is fixed, land as a factor of production is not completely fixed in supply, as more land can be made available through land reclamation schemes and better irrigation. The productivity of agricultural land can be increased by the use of fertilisers. It is true, however, that our natural resources are in finite supply. And we do not know their true extent with any certainty.

4.4.3 Protection of the Environment

Increased knowledge of the effects of the depletion of natural resources has led to an increased environmental awareness. There has been an increased interest in conservation and recycling and the search for alternative forms of energy.

You have probably seen or used the above sign for some of your activities. Most organisations today have systems in place to identify

products or waste that can be recycled. This is a positive development towards sustainability objectives.

A survey by the Department of the Environment in the UK recently found that 90 per cent of the adult population were either 'fairly concerned' or 'very concerned' about the environment. The issues that caused concern included traffic congestion, global warming, air and water pollution and depletion of the ozone layer. This change in public opinion has already had a major impact on the way in which business operates and is likely to have even bigger effects.

The UK government has a variety of targets for environmental protection. For example, it is committed to cutting the emission of carbon dioxide by 20 per cent by 2010, in line with the Kyoto agreement (see below for details on the Kyoto agreement). It wants 10 per cent of the UK's electricity to come from renewable sources by 2010. Local authorities are expected to recycle or compost 30 per cent of household rubbish by 2010. It has a target of 20 per cent of plastic to be recycled. Progress towards these targets and others is variable but the level of recycling in the UK is low by international standards.

It is often the case that legislation designed to protect the environment has the opposite effect. For example, the European directive that all fridges and cars should be recycled led initially to fridge and car-mountains springing up all over the place as people dumped them rather than pay the cost of recycling though the situation has now changed for the better in recent times.

4.4.4 The Kyoto Protocol – Negotiating the Protocol

The adoption of the Framework Convention on Climate Change (UNFCCC) in 1992 was a major step forward in tackling the problem of global warming. Nevertheless, as greenhouse gas (GHG) emission levels continued to rise around the world, it became increasingly evident that only a firm and binding commitment by developed countries to reduce emissions could send a signal strong enough to convince businesses,

communities and individuals to act on climate change. Member countries of the UNFCCC therefore began negotiations on a protocol – an international agreement linked to the existing Treaty, but standing on its own.

After two and a half years of intense negotiations, the Kyoto Protocol was adopted in Kyoto, Japan, on 11 December 1997. The Protocol shares the objective and institutions of the Convention. The major distinction between the two, however, is that while the Convention *encouraged* developed countries to stabilise GHG emissions, the Protocol *commits* them to do so. The detailed rules for its implementation were adopted in Marrakesh in 2001, and are called the "Marrakesh Accords."

Because it will affect virtually all major sectors of the economy, the Kyoto Protocol is considered to be the most far-reaching agreement on the environment and sustainable development ever adopted. However, any treaty not only has to be effective in tackling a complicated worldwide problem, but must also be politically acceptable. Most of the world's countries eventually agreed to the Protocol, but some nations chose not to ratify it. Following ratification by Russia, the Kyoto Protocol entered into force on 16 February 2005.

4.4.5 Fair Targets and Flexible Ways of Meeting Them

The Protocol requires developed countries to reduce their GHG emissions below levels specified for each of them in the Treaty. These targets must be met between 2008 and 2012, and add up to a total cut in GHG emissions of at least 5% against the baseline of 1990. Reviews and enforcement of these commitments are carried out by United Nations-based bodies. The Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities." This has two main reasons. Firstly, those countries can more easily pay the cost of cutting emissions. Secondly, developed countries have historically contributed more to the problem by emitting larger amounts of GHGs per person than in developing countries.

In order to give parties a certain degree of flexibility in meeting their emission reduction targets, the Protocol developed three innovative mechanisms, known as:

- Emissions Trading
- Joint implementation
- The Clean Development Mechanism (CDM)

These so-called “market-based mechanisms” allow developed parties to earn and trade emissions credits through projects either implemented in other developed countries or in developing countries, which they can use towards meeting their commitments. These mechanisms help identify lowest-cost opportunities for reducing emissions and attract private sector participation in emission reduction efforts. Developing nations benefit in terms of technology transfer and investment brought about through collaboration with industrialised nations under the CDM.

4.4.6 Compelling scientific evidence

Some scientists have doubted the scientific basis of the Kyoto Protocol, claiming that there is not a clear connection between increases in GHG emissions and climate change. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), launched in the course of 2007, put an end to that discussion. Prepared by scientists from all over the world, it placed the reality of human-induced climate change beyond any doubt. It is politically significant that governments endorsed the IPCC’s Fourth Assessment Report by consensus, making it a solid foundation for sound political decision making.

The Kyoto Protocol is generally seen as an important first step towards a truly global emission reduction regime that will stabilise GHG concentrations at a level which will avoid dangerous climate change. As a result of the Protocol:

- Governments have already put, and are continuing to put, legislation and policies in place to meet their commitments

- A carbon market has been created
- More and more businesses are making the investment decisions needed for a climate-friendly future

The Protocol provides the essential architecture for any new international agreement or set of agreements on climate change. The first commitment period of the Kyoto Protocol expires in 2012. By then, a new international framework needs to have been negotiated and ratified that can deliver the stringent emission reductions the IPCC tells us are needed.

Task 4.2

Explain The Kyoto Protocol in your own words.

4.4.7 Materials we use in everyday life

As nations develop and move from primary (extraction of raw materials from 'Earth') through secondary (manufacturing and production – using the raw materials) to tertiary sectors (service industries such as finance, banking and insurance), we see that the demands on the primary sectors increase considerably. Consider, for example, the current situation with China, whose march forward is consuming huge quantities of raw materials and energy. This, we must note, is not only for home consumption but to satisfy the huge demands from the rest of the world for China's diverse and cheap goods. The salutary message is that many of the materials used to produce our favoured goods of today are not inexhaustible. They will run out one day! As such, they are termed 'unsustainable'.

4.4.8 The impact of cars, machinery and equipment in everyday use

The key here is technology, which we can define as the application of scientific knowledge for practical purposes. In the past decade there have been significant technological developments that have transformed all aspects of our lives. We are personally familiar with the impact that cars have made. Is it not the desire of most young people to learn to drive and then own their own car?

We are equally familiar with the vast range of electronic equipment that is commonplace in our lives. We have become the consumer society. Many of those objects we now take for granted in our lives – cell phones, iPods, laptops, etc. – are imported. Flown in by cargo 747s or huge container ships, they add directly or indirectly to the greenhouse gases that we studied a few paragraphs above!

4.5 Good Practice

We have seen that organisations are under pressure to take measures that:

- Protect the environment
- Provide the workforce with safe operating conditions

In recent years, there have been a number of examples where this has not happened, with tragic results. The most serious event happened in the Indian town of Bhopal. A report titled “The Agony of Bhopal” says it all:

‘On 3rd December 1984, poison gas leaked from a Union Carbide factory, killing thousands. How many thousands, no one knows. Carbide says 3,800. Municipal workers, who picked up bodies with their own hands, loading them onto trucks for burial in mass graves or to be burned on mass pyres, reckon they shifted at least 15,000 bodies. Survivors, basing their estimates on the number of shrouds sold in the city, conservatively claim about 8,000 died in the first week. Such body counts become meaningless when you know that the dying has never stopped.

The Union Carbide factory in Bhopal seemed doomed almost from the start. The company built the pesticide factory there in the 1970s, thinking that India represented a huge untapped market for its pest control products. However, sales never met the company’s expectations; Indian farmers, struggling to cope with droughts and floods, didn’t have the money to buy Union Carbide’s pesticides. The plant, which never reached its full capacity, proved to be a losing venture and ceased active production in the early 1980s.

However, vast quantities of dangerous chemicals remained; three tanks continued to hold over 60 tons of methyl isocyanate, or MIC for short. Although MIC is a particularly reactive and deadly gas, the Union Carbide plant’s elaborate safety system was allowed to fall into disrepair. The management’s reasoning seemed to be that since the plant had ceased all production, no threat remained. Every safety system that had been installed to prevent a leak of MIC – at least six in all – ultimately proved inoperative.

Catastrophes such as Bhopal were a wake up call to all organisations to improve their operations. However, not all countries and industries have improved matters. Short cuts are taken in the pursuit of production and profit – sadly, still sometimes at the expense of workers’ wellbeing. In

contrast, the following can be quoted as examples of well known companies who have acted more virtuously:

- Nike, along with numerous other American and European firms that produce or sell apparel, footwear, sporting equipment, and toys, monitors working conditions in its supplier factories in developing countries
- Ikea requires its rug suppliers in India to prohibit the employment of children and provides families with financial assistance to help keep their children out of the labour market
- Home Depot, along with major retailers of wood products in the United States and Europe, no longer sells products harvested from old growth or endangered forests
- Chiquita has implemented stringent environmental practices for its suppliers of bananas in Central America
- PepsiCo, along with more than a dozen oil companies and consumer goods manufacturers, has withdrawn its investment from Myanmar because of human rights concerns
- Timberland allows its employees to take one week off with pay each year to work with local charities

(This list was extracted from “The Market for Virtue”, Vogel 2006).

Task 4.3

List six examples of well known companies who have carried out ‘virtuous’ ways of operating.

We may also note other corporate attempts at operating ethically and with some positive impact on sustainability. An example in the world of timber

is the Forest Stewardship Council (FSC). Following several years of negotiations among foresters, scientists and industry, the FSC was established in 1993 and began operations in 1996. An ambitious project, the FSC is an international private standard setting body with headquarters in Mexico. It attempts to govern international forestry trade and consumption. Its goal is to create a market for wood harvested in a socially and environmentally sound manner. It does this by providing sound business incentives to support certification.

By bringing transparency to the supply chain of forestry products, the FSC attempts to prevent 'bad' companies from hiding behind the excuse that they are unable to identify their supply sources and enables 'good' companies to receive credit for using more responsible suppliers. Essentially, the FSC establishes a framework for collaboration and negotiations among retailers, civic organisations and forestry operations.

Task 4.4

a. Write notes on FSC.

b. Visit a supplier of raw timber and observe if it sells FSC certified products.

We have noted the global nature of environmental matters and could ask 'is there any organisation that is able to address some of these problems'? One answer would be yes! – The International Standards Organisation ISO. ISO is a non-governmental organisation that forms a bridge between the public and private sectors. On the one hand, many of its member institutes are part of the governmental structure of their countries, or are mandated by their government. On the other hand, other members have their roots uniquely in the private sector, having been set up by national partnerships of industry associations. Therefore, ISO enables a consensus

to be reached on solutions that meet both the requirements of business and the broader needs of society. ISO is the world's largest developer and publisher of International Standards.

4.5.1 ISO 14000 and its Essentials

Having studied the serious matters of climate change and other environmental concerns, we may now look at the action taken by the International Standards Organisation (ISO) in implementing ISO 14000.

The ISO 14000 family addresses various aspects of environmental management. The very first two standards, ISO 14001:2004 and ISO 14004:2004, deal with environmental management systems. The other standards and guidelines in the family address specific environmental aspects including labelling, performance evaluation, lifecycle analysis, communication and auditing. An organisation of any size or type with ISO 14000 accreditation has to have a management system that enables it to:

- Identify and control the environmental impact of its activities, products or services
- Improve its environmental performance continually
- Implement a systematic approach to setting environmental objectives and targets, to achieving these and to demonstrating that they have been achieved

ISO 14001:2004 does not specify levels of environmental performance. If it did, they would have to be specific to each business activity and this would require a specific management standard for each business. That is not the purpose.

ISO has many other standards dealing with specific environmental issues. The intention of ISO 14001:2004 is to provide a framework for a holistic, strategic approach to the organisation's environmental policy, plans and actions. It gives the generic requirements for an environmental management system. The underlying philosophy is that whatever the organisation's activity, the requirements of an effective environmental

management system are the same. This has the effect of establishing a common reference for communicating about environmental management issues between organisations and their customers, regulators, the public and other stakeholders.

Because ISO 14001:2004 does not lay down levels of environmental performance, the standard can be implemented by a wide variety of organisations, whatever their current level of environmental maturity. However, a commitment to compliance with applicable environmental legislation and regulations is required, along with a commitment to continual improvement – for which the environmental management system provides the framework.

ISO 14001:2004 is a tool that can be used to meet *internal* (that is, within the organisation) objectives by**:**

- Providing assurance to management that it is in control of the organisational processes and activities that have an impact on the environment
- Assuring employees that they are working for an environmentally responsible organisation

ISO 14001:2004 can also be used to meet *external* (that is in the wider community – in other words – all of us!) objectives by**:**

- Providing assurance on environmental issues to external stakeholders such as customers, the community and regulatory agencies
- Complying with environmental regulations
- Supporting the organisation's claims and communication about its own environmental policies, plans and actions
- Providing a framework for demonstrating conformity via suppliers' declarations of conformity, assessment of conformity by an external stakeholder – such as a business client – and for certification of conformity by an independent certification body.